94th Congress
2d Session { JOINT COMMITTEE PRINT

DEVELOPMENT, USE, AND CONTROL OF NUCLEAR ENERGY FOR THE COMMON DEFENSE AND SECURITY AND FOR PEACEFUL PURPOSES

SECOND ANNUAL REPORT

TO THE

UNITED STATES CONGRESS

BY THE

JOINT COMMITTEE ON ATOMIC ENERGY

PURSUANT TO

SECTION 202(b) OF THE ATOMIC ENERGY ACT, AS AMENDED

JUNE 30, 1976

Printed for the use of the Joint Committee on Atomic Energy

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DEVELOPMENT, USE, AND CONTROL OF NUCLEAR ENERGY FOR THE COMMON DEFENSE AND SECURITY AND FOR PEACEFUL PURPOSES

Purpose of the Report

Pursuant to section 202(b) of the Atomic Energy Act of 1954, as amended, the members of the Joint Committee on Atomic Energy are required to, on or before June 30 each year, report to their respective Houses on the development, use, and control of nuclear energy for the common defense and security and for peaceful purposes.

It is required that each report provide facts and information available to the Joint Committee on matters of weaponry; foreign policy; defense; international trade; and in respect to the expenditure and appropriation of Government revenues. Further, that in recognition of the need for public understanding, presentation of the reports shall be made to the maximum extent possible in open sessions and by means of unclassified written materials.

This is the second report submitted in response to that requirement. The report categorizes, in unclassified form, the major nuclear issues within the framework of the above which are now and probably will be of direct concern to the Congress within the next 12 months.

This report is intended to provide useful unclassified information on nuclear national security matters. It does not present conclusions of the Joint Committee or its members, even though the members may have strong convictions about the matters discussed. However, several definitive statements were made during the year by Joint Committee members on the basic issues discussed. They are included for information within the appendices.

Chronology

Some of the key events during the past year which had an impact upon nuclear national security policy interests within the Congress were:

a. June 27, 1975. Brazil and the Federal Republic of Germany signed a nuclear agreement which will provide Brazil a complete nuclear fuel cycle. This agreement is of major importance as an example of the potential spread of nuclear weapons capability through export of nuclear equipment and technology.

b. September 1, 1975. Israel and the United States initialed an agreement which traded Israeli withdrawal from part of the Sinai Peninsula for U.S. participation in a monitoring force. From a nuclear standpoint, the agreement included provisions in which the U.S. promises advanced military equipment including some nuclear-capable systems such as the Pershing missile.

c. December 11, 1975. NATO Ministers agreed to a U.S. proposal to include the withdrawal of a significant number of U.S. nuclear weapons in Europe in the negotiations for Mutual and Balanced Force Reductions (MBFR) with the Warsaw Pact nations.

d. December 12, 1975. The Senate passed Senate Resolution 221, which called upon the President to take certain actions to improve international safeguards in the export of nuclear equipment, materials and technology.

e. January 26, 1976. Spain and the United States signed a Treaty in which, among other things, the United States agreed to withdraw any nuclear weapons deployed in Spain by June 1979.

f. January 30, 1976. The Republic of Korea canceled its planned purchase from France of a plutonium reprocessing plant. This action was taken after strong pressure from the United States Government.

g. February 23, 1976. The United States and six other nuclear supplier nations announced an agreed set of principles by which they would conduct their nuclear export transactions in order to maintain a degree of standardization of safeguards in these transactions.

h. March 31, 1976. The Threshold Test Ban Treaty, signed on July 3, 1974, established this date as the cutoff for nuclear weapons tests exceeding 150 kilotons in yield. However, the treaty had not been sent to the U.S. Senate for ratification by that date. The Executive Branch was waiting to complete a companion treaty with the Soviet Union on conduct of peaceful nuclear explosives.

i. May 24, 1976. Japan ratified the Non-Proliferation Treaty.

j. May 28, 1976. The United States and the Soviet Union signed an agreement on the detonation of peaceful nuclear explosives. This was a companion agreement to the Threshold Test Ban Treaty. Its outstanding provision is an inclusion of an on-site inspection. This is the first time that on-site inspection has been included in an arms control agreement with the Soviet Union.

Summary of Key Issues

In examining the events listed in the chronology above, several major problem areas are apparent:

1. The increased danger of more nations seeking an independent nuclear weapons capability and the need to develop more effective methods to deter and delay this threatened proliferation of nuclear weapons.

2. The growing Soviet strategic nuclear capability and the consequent need to cause a mutual slowdown in both the qualitative and quantitative efforts of both the Soviet Union and the United States in strategic arms.

3. If that mutual reduction in strategic arms cannot soon be accomplished, the question continues whether the United States must pursue actively its programs of strategic initiatives to improve the quality of its own strategic arms capability.

4. The continuing but growing need to improve the physical security protection given to the many U.S. nuclear weapons deployed outside the continental United States.

5. The need to assure that the U.S. nuclear weapons which are now deployed overseas under earlier security conditions and doctrines match the present foreign policy and security objectives.

6. The need to improve the safeguards against possible diversion or theft of nuclear materials; sabotage of nuclear facilities; or other acts of nuclear-related terrorism.

These are the identical key issues noted in the First Annual Report submitted in 1975, which indicates that there has been little major progress in the solution during the past year. There are a number of subordinate issues to these six overall problems. They are described in some detail in the sections which follow.

PROLIFERATION

Definitions

The proliferation of nuclear weapons is the increase of weapons already possessed by a nuclear-capable nation (vertical proliferation), and the increase of nations which have demonstrated a capability of developing, producing, or obtaining nuclear weapons (horizontal proliferation). Nuclear proliferation is considered by most nations to be undesirable as it is believed to increase the probability of nuclear war. At the least, it will create new uncertainties and probable instabilities in the international situation.

The problem of vertical proliferation is generally associated with the number and quality of nuclear weapons now owned and being developed by the two nuclear super-powers—the Soviet Union and the United States. The potential resolution of vertical proliferation is being approached through the bilateral Strategic Arms Limitation negotiations (SALT) which have been conducted by the two nations since 1969. The issues related to vertical proliferation are listed under the subject of Arms Control in this report.

Nuclear Capable Nations

The nuclear capable nations, as of May 15, 1976, are: the Soviet Union; the United States; Britain; France; and, the Peoples Republic of China. When India detonated its "peaceful nuclear explosive" on May 17, 1974, the world considered that she joined the nuclear club. During the past year, there have been increasing indications that Israel has also become a member of this now less than exclusive club, although she neither admits to such a capability, nor has there been any evidence of Israel conducting any nuclear explosions.

Nuclear Potential Nations

As nuclear technology advances there are an increasing number of nations which have the technological capacity to develop nuclear weapons within the next twenty-five years. The deterrent to such action is predominantly world opinion. For most of these nations, there are also satisfactory security assurances from larger nuclear powers which make their possession of nuclear weapons unnecessary. The growing dangers of proliferation, discussed in more detail below, may come from a collapse in the credibility of these security assurances, along with a growing danger of unfriendly neighboring states which seem to be acquiring the weapons. Table 1 lists the potential *N*th countries as evaluated by the Energy Research and Development Administration.

TABLE 1. *Potential Nth countries*, as of April 1976

[Indicates technical capability only. There is no speculation inferred on the political motivation to develop a nuclear weapons capability]

A. Countries which appear technically capable of detonating a nuclear device in the short term (within less than 1—up to 3 years of a decision to do so).

Canada
Republic of China
Israel
Italy
Japan
South Africa
Spain
Sweden
Switzerland

B. Countries which appear technically capable of detonating a nuclear device in the intermediate term (within 4 to 6 years of a decision to do so).

Argentina
Austria
Belgium
Brazil
Czechoslovakia
Denmark
East Germany
Republic of Korea
The Netherlands
Norway
Poland

C. Countries which appear technically capable of detonating a nuclear device in the longer term (within 7 to 10 years of a decision to do so).

Egypt
Finland
Iran
Mexico
Pakistan
Portugal
Romania
Turkey
Yugoslavia

NON-PROLIFERATION TREATY

The first major step in resolving the horizontal proliferation problem was the Non-Proliferation Treaty which became effective in March 1970 [Appendix A–1]. A major impetus within the United States Government for the Non-Proliferation Treaty (NPT) was Senate Resolution 179 which was introduced by Senator John O. Pastore and passed by the Senate on May 17, 1966, by a vote of 84 to 0. Senate Resolution 179 included the following words:

> *Resolved:* That the Senate commends the President's serious and urgent efforts to negotiate international agreements limiting the spread of nuclear weapons and supports the principle of additional efforts by the President which are appropriate and necessary in the interest of peace for the solution of nuclear proliferation problems.

As of May 30, 1976, 98 nations are a party to the NPT, with an additional 12 nations which have signed but not ratified the Treaty. Appendix A–2 lists the status of nations participating in the NPT. The most notable nations which have neither signed nor are a party to the NPT are three nuclear capable nations: France; the Peoples Republic of China; and, India. Others *not* a party to the Treaty but which are potentially capable of developing nuclear weapons before the end of the century—or sooner if the political motivation so dictated—are: Argentina; Brazil; Egypt; Israel; Pakistan; Portugal; South Africa; Spain; Switzerland; and Turkey.

GENEVA REVIEW CONFERENCE

During May 1975 the Geneva Conference to Review the Non-Proliferation Treaty was conducted in accord with Article VIII, Section 3, of the Treaty for the objectives of "assuring that the purposes of the Preamble and the provisions of the Treaty are being realized." The Final Declaration of the Review Conference, published

May 30, 1975, noted a review of each article of the Treaty and included the following reaffirmation to the purposes of the Treaty:

> The States Party to the Treaty reaffirm their strong common interest in averting the further proliferation of nuclear weapons. They reaffirm their strong support for the Treaty, their continued dedication to its principles and objectives, and their commitment to implement fully and more effectively its provisions.
>
> They reaffirm the vital role of the Treaty in international efforts:
>
> To avert further proliferation of nuclear weapons;
>
> To achieve the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament; and
>
> To promote co-operation in the peaceful uses of nuclear energy under adequate safeguards.

In its review of Treaty articles, very little specific action was recommended. However, it took special note of the possible benefits of regional or multinational fuel cycle centers.

> The Conference recognizes that regional or multinational nuclear fuel cycle centres may be an advantageous way to satisfy safely and economically, the needs of many States in the course of initiating or expanding nuclear power programmes, while at the same time facilitating physical protection and the application of IAEA safeguards, and contributing to the goals of the Treaty.

The Conference also reaffirmed confidence in the International Atomic Energy Agency as a key element in the effort to control nuclear proliferation.

International Atomic Energy Agency

There have been a number of suggestions by Members of Congress which would strengthen the role and authority of the International Atomic Energy Agency in Vienna. The IAEA's role in the safeguarding of nuclear materials is especially important to the control of nuclear proliferation. The objectives and functions of the IAEA safeguard systems are described in a May 6, 1975, Report by the President to the Congress on "Laws and Regulations Governing Nuclear Exports and Domestic and International Nuclear Safeguards."

> The objective of IAEA safeguards is the prevention of national diversion of nuclear material from peaceful application by the risk of early detection. In this effort, the IAEA relies heavily, but by no means exclusively, on existing national control systems to generate information for transmittal to IAEA. The major elements of the IAEA system are (a) material accountancy, (b) containment and (c) surveillance. The basic pr nciple of the IAEA system lies in a comparison of information provided by the country being inspected and the verification observation provided by the Agency. IAEA inspectors are accorded extensive opportunities to physically inspect and take independent measurements at safeguarded facilities, and their intensity of access increases with the strategic value of the nuclear materials at given locations. The system has undergone periodic upgrading and was extensively revised in 1970 to reflect the major new responsibilities the IAEA has assumed under the Treaty on the Non-Proliferation of Nuclear Weapons. Should a diversion be detected, specific

penalties are possible including suspension of IAEA membership, disclosure of the diversion to the UN Security Council and General Assembly, and censure by the international community. The IAEA system does not in itself allow for direct intervention for the prevention of diversion by terrorist or dissident groups.

The effectiveness of the IAEA has been of particular concern to Members of the Congress. Senator Stuart Symington visited the IAEA June 29 through July 3, 1975, and reported to the Senate on that visit July 15 [Appendix A–3]. He expressed concern over the ability to enforce sanctions in the case of safeguard violations detected by IAEA.

> . . . Any enforcement of sanctions in the case of safeguard violations detected by the IAEA—that is, diversion of nuclear fuel from peaceful to weapons-development purposes—would appear to be the responsibility of the United Nations. As a congressional representative on the U.S. Delegation to the last U.N. session, however, I found the possibility would be remote indeed that the U.N. would enforce sanctions against a country which obtained nuclear weapons.

The adequacy of IAEA Safeguards is discussed in greater detail in the section on Safeguards of this report.

Nuclear Export

During the past year the key events affecting nuclear proliferation have centered upon the export of nuclear materials, equipment and technology. Of particular concern have been the sale by two of the nuclear supplier nations, France and West Germany, of the critical items of the fuel cycle: fuel reprocessing and uranium enrichment plants. Table 2 lists these transactions.

Table 2. *Announced major transactions in the nuclear fuel cycle,* May 1975–May 1976

June 1975:
- Agreement between Federal Republic of Germany and Brazil (signed):
  - Uranium exploration and mining.
  - Uranium enrichment (200 metric ton demonstration plant by 1981; commercial-scale plant to follow. Nozzle separation process).
  - Fuel element fabrication (pilot plant followed by commercial plant).
  - Reprocessing (pilot plant).
  - Power reactors (four 1300MWe PWR's by 1985 and plans for four more by 1990).
  - Reactor components manufacture (capability for large components by 1985).

January 1976: Agreement between France & Pakistan (initialed): Supply of French reprocessing plant, scheduled for operation about 1980.

February 1976: Cancellation of French supply of pilot reprocessing to the Republic of Korea.

Further, within the United States there were other proposed nuclear sales which caused concern within the Congress over the mechanism for licensing nuclear exports within the U.S. Government. The Senate Government Operations Committee held extensive hearings on this matter and has reported out S. 1439 which would make certain changes to the existing nuclear export licensing procedures. It is anticipated that the Congress will consider the bill in this session. The issue of nuclear export has become so critical that it will be addressed separately in this report in the next section.

Joint Committee on Atomic Energy Interest

Through the years, the Joint Committee on Atomic Energy not only has been a strong voice decrying the threat of a nuclear proliferated world but has acted consistently to encourage the Executive Branch to take prudent and workable actions to delay, discourage, and prevent if at all possible the spread of nuclear weapons. It was by the direct action of the Joint Committee or its members which:

1. In May 1966 encouraged the Executive Branch to proceed seriously with negotiations for a Non-Proliferation Treaty (NPT).
2. In July 1968 insisted upon the inclusion of Article III into the NPT—which defined the safeguards requirements.
3. In May 1974 raised the seriousness to nuclear proliferation posed by the Indian nuclear detonation of May 17, 1974.
4. In June 1974 defined the need to examine carefully the safeguard requirements of the then proposed nuclear power agreements between the United States and the Governments of Egypt and Israel. It is because of unsatisfactory safeguard provisions that neither of these agreements have been submitted to the Congress.
5. As a result of this Mid-East proposal, initiated legislation which was passed by the Congress to assure adequate opportunity for the Congress to examine all Agreements for Co-operation on civilian nuclear power between the United States and other governments. This was the amendment to Section 123d of the Atomic Energy Act on October 26, 1974 (Public Law 93–485).
6. In June 1975, raised strong objection to the agreement between the Federal Republic of Germany and Brazil on the construction in Brazil of a complete nuclear fuel cycle. [Appendix A–8]
7. In December 1975 initiated Senate Resolution 221 to encourage the Executive Branch to bring to a successful conclusion the agreement between nuclear supplier nations, the terms of which were announced on February 2, 1976. [Appendix B–1].

During the past year several Members of the Joint Committee have made statements which deal directly with the problem of proliferation. Appendix A–4 is a speech by Chairman John O. Pastore before the Fiftieth American Assembly on April 22, 1976, on the Peaceful Uses of Nuclear Energy. This includes an important section on proliferation. Appendix A–5 is a speech by Senator Stuart Symington reported to the Senate on October 22, 1975, on "Nuclear Proliferation and Counterforce." Appendix A–6 is a statement by Senator Symington to the Senate of April 14, 1976, "The Nuclear March to Armageddon." Appendix A–7 is the March 26, 1976, statement to the Senate by Senator John V. Tunney in which he introduced Senate Resolution 415 which urges the President to suspend the transfer of certain nuclear materials to India pending public hearings by the Nuclear Regulatory Commission. Appendix A–8 is the June 3, 1975, statement by Senator Pastore to the Senate on the danger of nuclear proliferation involved in the FRG-Brazil nuclear fuel cycle agreement. Appendix A–9 is a statement by Representative George E. Brown, Jr., on "Nuclear Proliferation" in which he includes for the record a valuable summary by the Congressional Research Service on nuclear proliferation issues. These statements are firm indications of the Joint Committee's continuing concern over the problems of nuclear proliferation.

NUCLEAR EXPORT AND CONTROL

Background

The "Atoms for Peace" program instituted by President Eisenhower in December 1953 and the subsequent Atomic Energy Act of 1954, as amended, promoted the development of international cooperation in the peaceful uses of atomic energy under controls which would prevent the proliferation of nuclear weapons. Since 1954, the United States has been the leader in the export of nuclear power and research reactors and, up until recently, held virtually a world-wide monopoly in the nuclear services to support these reactors. Appendix H–10 is a table prepared by ERDA which shows the estimated cumulative value of reactor sales and fuel enriching services of the nuclear exporting countries through December 1975. It notes that the United States has received some $29 billion from its nuclear exports, $10 billion from reactor sales and $19 billion for enriching services (which has entered the U.S. Treasury). This represents about 58% of the world-wide nuclear export market of about $50 billion.

Agreements for Cooperation

The Agreement for Cooperation in the Civil Uses of Atomic Energy is the mechanism for Congressional control over nuclear exports and to assure that there is established a satisfactory system of U.S. or international safeguards to prevent peaceful applications of nuclear energy from being diverted to weapons purposes. The United States has in force Agreements for Cooperation with 29 nations and two international organizations, the International Atomic Energy Agency (IAEA) and the European Atomic Energy Community (EURATOM).

Under section 123d of the Atomic Energy Act of 1954, as amended, after an Agreement for Cooperation has been negotiated it is forwarded to the Congress where it lays for 60 days while the Congress is in session. The Agreement will not go into effect if, during the 60-day period, the Congress passes a concurrent resolution stating in substance that it does not favor the proposed Agreement for Cooperation. During the period the Joint Committee on Atomic Energy would hold hearings and make a report to the Congress on the proposed Agreement.

Nuclear Export Licensing Procedures

Under the framework of the Agreement for Cooperation, a U.S. vendor may apply to the Nuclear Regulatory Commission (NRC) for a license to export nuclear equipment, material and/or technology. On February 2, 1976, the President issued Executive Order 11902, "Procedures for an Export Licensing Policy as to Nuclear Materials and Equipment" [Appendix B–1]. This order designated the Department of State as the agency to receive the export license

application from the NRC to establish the Executive Branch position on the proposed license and to notify the NRC of that position for its consideration before the license is issued.

Appendix B–2 is a description prepared by the NRC for this report of its licensing procedures and defines the eight specific areas it reviews in assuring that the export would be used exclusively for peaceful purposes and would meet the "common defense and security requirement of the Atomic Energy Act."

The Senate Government Operations Committee has examined in detail nuclear export licensing procedures during the past year and has reported out bill S. 1439 which would reorganize certain nuclear export functions of the Federal Government. It would, among other things, assure that *all* nuclear export licenses would be issued by the NRC. At the present time there are still licensing functions for nuclear equipment components resting within the Department of Commerce, and ERDA with respect to technology.

Nuclear Export Licensing Activity

Appendix B–9 is a summary of the export licensing activities of the NRC for the period May 1, 1975, through April 30, 1976. It notes that 264 licenses were issued in the period (including 6 reactors) with 115 more applications pending on April 30. Appendix B–10 is a detailed listing of the major cases for which the NRC issues licenses. Appendix B–11 is a listing by the NRC of major licenses pending. These listings are included in order to show the breadth and extent of the U.S. nuclear export industry.

Nuclear Supplier Nations

During the past two years it has become clear that the number of nations capable of manufacturing and exporting elements of the nuclear fuel cycle is increasing and that their share of the world-wide nuclear export market is increasing at the expense of the United States. Table 3 below shows the extent of this spread of nuclear supplier nations.

TABLE 3. POWER REACTORS BUILT OR PLANNED, REFLECTING SUPPLIER AND USING COUNTRIES

	Number of reactors	Megawatts-electrical
West German supplied power reactors:		
Germany	47	50, 808
Argentina	1	340
Austria	1	723
Iran	2	2, 400
Netherlands	1	477
Switzerland	1	970
French supplied power reactors:		
France	39	32, 616
Belgium	7	5, 696
Iran	2	2, 400
Canadian supplied power reactors:		
Canada	25	14, 141
Argentina	1	649
India	2	440
Korea	2	1, 358
Pakistan	1	137
Russian supplied power reactors:		
U.S.S.R	23	9, 931
Bulgaria	4	1, 760
Finland	6	3, 437
East Germany	2	730
Hungary	2	880
Japanese supplied power reactors: Japan	23	15, 438
Other locally built power reactors:		
Czechoslavakia	5	1, 795
India	4	940
Italy	7	5, 214
Spain	11	10, 133
Sweden	9	5, 902
Switzerland	5	4, 240
United Kingdom	25	18, 333
U.S. supplied power reactors:		
United States	237	214, 615
Brazil	1	626
Germany	1	237
India	2	400
Italy	3	1, 379
Japan	3	1, 120
Korea	2	1, 128
Mexico	2	1, 200
Philippines	2	1, 252
Spain	10	7, 901
Sweden	3	2, 400
Switzerland	6	3, 332
Taiwan	6	4, 792
Yugoslavia	1	600

Appendix B–3 is a table which describes the capabilities of the various countries to supply elements of the nuclear fuel cycle. There are 18 nations listed on this table. Thus, it is apparent that this growth of nuclear supplier nations poses increasing problems to the United States and to the world on trying to stem the rush to nuclear proliferation.

FRG–Brazil Nuclear Fuel Cycle Agreement

The major event of the past year which exemplified this growing danger was the agreement signed on June 27, 1975 between Brazil and the Federal Republic of Germany in which West Germany would construct in Brazil a full nuclear fuel cycle including a uranium enrichment plant and a fuel reprocessing plant. This agreement caused immediate concern within the Congress as a whole and in the Joint Committee on Atomic Energy in particular. Appendix A–8 is the statement of Senator John O. Pastore to the Senate on June 3, 1975, soundly denouncing that agreement. Senator Stuart Symington, as Chairman of the Arms Control, International Organizations and Security Agreements of the Senate Foreign Relations Committee,

held extensive hearings on this landmark agreement during July 1975. A key factor in the concern over the agreement is the fact that Brazil is not a party to the Non-Proliferation Treaty and has not denied an ultimate goal of developing a nuclear capability.

Nuclear Supplier Conferences

The growing number of nuclear supplier nations, along with the increased market for nuclear power reactors due to the 1973–1974 oil embargo and price rise, has caused the United States to seek increased cooperation among the nuclear supplier nations in order to seek agreement on the safeguards which should be imposed on their nuclear exports. Conferences were held several times in London during 1975 and this year. By December 1975 the impact of the FRG-Brazil agreement and the possible sale of reprocessing plants by France to Pakistan and the Republic of Korea motivated the Senate to pass Senate Resolution 221 which urged the President to take the leadership in seeking international cooperation in strengthening safeguards of nuclear materials [Appendix B–5].

The nuclear suppliers conferences have been held in secret at the request of at least one of the participating nations. Some Members of the Joint Committee believe strongly that these conferences should be held in the open so that world opinion would be better informed on these critical nuclear matters. Appendices B–6 and B–7 are two statements on this matter by Senator Stuart Symington.

Principles Governing Nuclear Exports

During a February 23, 1976 hearing before the Subcommittee on Arms Control, International Organizations and Security Agreements chaired by Senator Stuart Symington, Dr. Fred C. Ikle, Director, Arms Control and Disarmament Agency, announced that the United States, together with other exporters, has decided to apply certain principles to our future nuclear exports (Appendix B–8). The principles described by Dr. Ikle are:

> The requirement that recipients must apply international (IAEA) safeguards on all nuclear imports.
>
> The requirement that the importer give assurances not to use these imports to make nuclear explosives for any purpose—whether called "peaceful" or not.
>
> The requirement that the importer have adequate physical security for these nuclear facilities and materials to prevent theft and sabotage.
>
> The requirement for assurances that the importers will demand the same conditions on any re-transfer of these materials or types of equipment to third countries.

These agreed principles are a hopeful sign. Yet, there continue to be nuclear sales which raise questions on how closely the other supplier nations will adhere to these principles such as the sale by France to South Africa of two reactors and France's sale of a reprocessing plant to Pakistan. Therefore, the Congress will continue to observe closely these type sales by the United States and other supplier nations as important to the overall problem of nuclear proliferation.

In June 1976 Senator Stuart Symington proposed an important amendment to the International Security Assistance and Export Control Act of 1976 which is a landmark in the control of nuclear exports. It is the first time that there have been enacted legislative restrictions upon certain critical nuclear exports. Senator Symington's amendment, as adopted by the Congress, states:

NUCLEAR TRANSFERS

SEC. 305. Chapter 3 of part III of the Foreign Assistance Act of 1961 is amended by adding at the end thereof the following new section:

"SEC. 669. NUCLEAR TRANSFERS.—No funds authorized or appropriated under this Act, the Arms Export Control Act, or any other Act (other than title II of the Agricultural Trade Development and Assistance Act of 1954 for disasters, famine, or other urgent or extraordinary relief requirements) may be used for the purpose of—

"(1) providing economic assistance;

"(2) providing military or security supporting assistance or grant military education and training; or

"(3) extending military credits or making guarantees;

to any country which—

"(A) delivers nuclear reprocessing or enrichment equipment, materials, or technology to any other country; or

"(B) receives such equipment, materials, or technology from any other country;

unless before such delivery—

"(i) the supplying country and receiving country have reached agreement to place all such equipment, materials, and technology, upon delivery, under multilateral auspices and management when available; and

"(ii) the recipient country has entered into an agreement with the International Atomic Energy Agency to place all such equipment, materials, technology, and all nuclear fuel and facilities in such country under the safeguards system of such Agency.".

"(b)(1) Provided, however, that the President may by Executive Order effective in not less than 30 days permit delivery to be made to a country to which such subsection would otherwise apply if he determines that (1) the termination of assistance would have a serious adverse effect on vital U.S. interests and (2) certifies that he has received reliable assurances that the otherwise ineligible country will not acquire or develop nuclear weapons or assist other nations to do so and transmits such determination to the Speaker of the House of Representatives and the Committee on Foreign Relations of the Senate; and such certification shall set forth the reasons supporting such determination in each particular case.

"(2)(A) The Congress may thereafter by joint resolution introduced within such 30 days terminate or restrict assistance described in paragraphs (1) through (3) of subsection (a) for a country to which such subsection applies or take any other action with respect to such assistance for such country as it deems appropriate.

"(B) Any such joint resolution with respect to a country shall, if introduced within 30 days after the transmittal of a certification

under paragraph (1) with respect to such country, be considered in the Senate in accordance with the provisions of section 601(b) of the International Security Assistance and Arms Export Control Act of 1976."

ARMS CONTROL

Background

Both the United States and the Soviet Union possess enough massive nuclear power to destroy the fabric of each other's industry and society were deterrence to fail and these weapons actually be used against each other. It has long been the policy of the U.S. Government to reduce the probability that nuclear weapons will be used and to find means to limit the growth of strategic nuclear arms and, ultimately, to cause a mutual reduction in their numbers.

Test Ban Treaties

LIMITED TEST BAN TREATY

The first major step in nuclear disarmament was the treaty banning nuclear weapons tests in the atmosphere, in outer space and underwater. This treaty, known as the Limited Test Ban Treaty, was signed at Moscow on August 5, 1963, after five years of intensive negotiations [Appendix C–1]. The basic obligation is stated in Article I of the Treaty, as follows:

> Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control:
>
> (a) in the atmosphere; beyond its limits including outer space or underwater, including territorial waters or high seas; or
>
> (b) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted.

The Treaty has been a success. France and the PRC are the only major nations not a party to the Treaty. However, In June 1974 President Giscard D'Estaing announced that all future French nuclear tests would be conducted underground, thus, effectively abiding by the terms of the Treaty. Even India's first nuclear detonation on May 17, 1974, was conducted underground, thus in observation of the Treaty.

Since the signing of the Limited Test Ban Treaty, the United Nations, through the Eighteen Nation Disarmament Committee (now known as the Conference of the Committee on Disarmament) has encouraged the extension of the Treaty to underground nuclear tests as well. There have been intermittent proposals to offer a treaty banning all underground nuclear tests (known as a Comprehensive Test Ban Treaty) or underground tests above some identifiable limit (known as a Threshold Test Ban Treaty).

THRESHOLD TEST BAN TREATY

On July 3, 1974, President Nixon signed a Threshold Test Ban Treaty (TTBT) with the Soviet Union [Appendix C–2]. It prohibits all nuclear weapon development tests larger in yield than 150 kilotons. It was scheduled to take effect March 31, 1976. However, shortly after the Treaty was signed, the Administration stated it would not submit the Treaty to the Senate for ratification until there was a companion agreement with the Soviet Union to include peaceful nuclear explosions (PNE) as well as nuclear weapons tests. Since the Soviet Union continues to have a strong PNE program, negotiation for the PNE agreement was long and difficult. As a result, the March 31, 1976, TTBT effectiveness date passed without the Treaty being submitted to the Senate for ratification. However, both nations have adhered to the Treaty beyond the cut-off date even without Treaty ratification.

PNE TREATY

On May 28, 1976, President Ford signed the Treaty on "Underground Nuclear Explosives for Peacfeul Purposes" with the Soviet Union [Appendix C–3]. This PNE Treaty places exactly the same 150 kiloton limit on the yield of any individual nuclear explosion for peaceful purposes. Further, it places the aggregate yield of any group of explosions (consisting of a number of individual explosions) under a limit of 1500 kilotons. (This permits the Soviet Union to conduct an important engineering project to construct a canal between the Pechora and Karma Rivers, to cause additional water to flow into the Caspian Sea.)

The PNE Treaty also includes the feature that provides information and access to sites of explosions by each side. The permitting of on-site access by observers is a landmark in U.S.-Soviet cooperation in implementing agreements concerned with nuclear arms control. This provision would permit, for example, American observers to place instruments down the emplacement hole of each nuclear device in a group explosion.

TREATY RATIFICATION

The signing of the PNE Treaty now makes possible the forwarding of both Treaties to the Senate for ratification. Ratification will be difficult. The Threshold Test Ban Treaty has been criticized widely within the Congress and the arms control community. Those who have criticized the Threshold Treaty have also criticized the companion PNE Treaty. This opposition is summarized in a May 28, 1976, press release by the Arms Control Association, which stated:

> The Association believes that the two treaties represent a disheartening step backward from responsible arms control policies. By permitting continued nuclear weapons tests of very sizeable magnitudes and by establishing arrangements for conducting nuclear explosions for peaceful purposes, the agreements are likely to delay indefinitely the achievement of a long-sought treaty banning all nuclear tests, and to provide new respectability for the arguments of states which seek to develop nuclear weapon capabilities by pro-

fessing an interest in peaceful explosions alone. By so doing, the proposed treaty sets back still further the prospects of preventing the spread of nuclear weapons to other countries, and for countering the grave threat to world peace and security such proliferation poses.

Those in support of that view would prefer to bypass these Treaties and proceed directly with the Soviet Union on a Comprehensive Test Ban Treaty which would limit all nuclear weapon tests. However, others note that if the Threshold Treaty were to be ratified, there will be a sound basis for further progress toward either a Comprehensive Test Ban Treaty or a Threshold Treaty with a yield limit lower than 150 KT. The Treaty states that as an objective. Further, ratification of the PNE Treaty would establish for the first time the firm basis for on-site inspection, a major step in improving arms control verification capabilities.

Strategic Arms Limitation Negotiations

BACKGROUND

Since 1969, the United States and the Soviet Union have engaged in a series of bilateral negotiations with the objective of limiting the growth of strategic nuclear arms owned by these two nuclear superpowers. This is an effort to solve the problem of vertical proliferation. It is obvious that each nation possesses enough massive strategic nuclear power to destroy the fabric of the other nation's industry and society. The cost to both nations for this power is staggering and is a diversion of resources from activities which would improve the welfare of each nation's peoples and of the rest of the world. More important they represent a destructive force which could endanger civilization were it ever to be employed. Therefore, the Congress has recognized the utmost importance of these bilateral negotiations with the Soviet Union.

SALT I

The first important result of these arms limitation negotiations was an interim agreement signed by the two nations at Moscow in May 1972 to freeze their land-based and submarine-based intercontinental ballistic missiles at the number then in operation or under construction; a permanent agreement to limit the number of launchers for each side's defensive missile system; and to limit deployment of antiballistic missile (ABM) defense systems to two sites, one defending each country's capital and the other defending an intercontinental ballistic missile system deployment area.

The Congress expressed its approval of the agreements by Public Law 92–448 of September 30, 1972, which "granted approval and authorization for the President of the United States to accept an Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on certain measures with Respect to the Limitation of Strategic Offensive Arms." Included in this law was an amendment by Senator Henry Jackson which had as a central provision a request to the President to seek a SALT Treaty that would involve equal limits to the intercontinental strategic forces of the U.S. and the Soviet Union.

VLADIVOSTOK AGREEMENT

Since SALT I, the U.S. and the Soviet Union have continued their negotiations with the objective of placing the interim limitations on strategic arms on a more permanent basis. On November 23, and 24, 1974, President Ford and General Secretary Brezhnev met in the area of Vladivostok. The Joint United States-Soviet Communique [Appendix C–4] stated that an objective of the SALT II negotiations would be to limit the number of strategic nuclear delivery vehicles to 2,400 and of those vehicles carrying MIRV's to 1,320.

SALT II

Negotiations have continued at Geneva since the Vladivostok meeting with the objective of formalizing into a treaty the provisions of that Agreement. The difficulties which have extended the negotiation have centered upon the problems of verification of MIRV-carrying missiles, what bomber systems are to be included as strategic delivery systems, and the characteristics of air-launched and sea-launched cruise missiles. Whether these matters can be successfully negotiated in this political year is still unclear.

An apparent majority of the Congress, being intensely aware of the costs and dangers of large strategic nuclear delivery systems, believes that realistic progress toward mutual strategic force reductions is a necessity. There are others within the Congress who are wary of a SALT II Treaty in light of questions raised during the past year on whether there have been violations of the SALT I Treaty. Appendix C–5 is a statement made by Senator James L. Buckley to the Senate on December 18, 1975, which reflects this view.

ISSUES OF SALT II

In the event that the Administration completes successful SALT II negotiations, some of the following issues will be of concern to the Congress:

1. If SALT II includes the Vladivostok limitations, do those limitations (2,400 delivery vehicles, including 1,320 MIRV carriers) actually place a "cap on the arms race"?
2. What is the impact of the Soviet Union significant advantage in throw-weight upon the perceived balance of strategic capabilities between the two nations? Will they thus be able to overcome in the near future the major U.S. advantage of numbers of deliverable nuclear warheads? What would be the ultimate foreign policy result if that would be achieved by the Soviet Union?
3. Is there adequate provision for verification of the Treaty provisions?
4. Should the Treaty (if that be the result of SALT II) be ratified or should ratification be delayed pending more definitive results of detente between the two nations?
5. Should there be insistence on delaying ratification of any SALT II Treaty in order to gain agreement on numerical limitations lower than those agreed to at Vladivostok?

Mutual and Balanced Force Reductions Negotiations

BACKGROUND

Since October 1973, the United States, in cooperation with its NATO allies, has been engaged in multilateral negotiations at Vienna with the Soviet Union and its Warsaw Pact allies on the Mutual and Balanced Force Reductions (MBFR) of troops and weapons in the central region of Europe. As its initial negotiation position, NATO sought reduction of Soviet forces (predominantly tank forces) in the Central Region, with a concurrent reduction of U.S. ground forces only. The Warsaw Pact, on the other hand, sought reduction of U.S. aircraft and nuclear weapons as well as reduction of American and West German ground forces. Because of those differing objectives the negotiations stalled.

In order to break the stalemate by mid-1975 the United States, according to press reports, proposed to its NATO allies that there be included in the negotiations a reduction of 1,000 U.S. nuclear weapons from Europe in addition to the proposed reduction of U.S. ground forces. This would cause, hopefully, Soviet agreement for reduction of a tank army of about 69,000 troops and 1,700 tanks. This proposal was agreed to by the NATO allies in December 1975 and was made to the Warsaw Pact that month. As of June 1976, there has been no indication that this "sweetener" offer has broken the stalemate. There still appears to be no immediate prospect of near-term agreement which will be of immediate legislative concern to the Congress.

ASPECTS OF MBFR

The MBFR negotiations have direct nuclear-related aspects which do concern the Congress. (These are discussed more extensively in the section of this report on deployments.) The principal difficulty of MBFR at this moment is the relation of the level of U.S. forces and nuclear weapons to the credibility of U.S. commitments to the North Atlantic Alliance.

A second difficulty is that MBFR is a multilateral negotiation and it will be much more difficult to produce an effective agreement than any of the bilateral SALT negotiations.

STRATEGIC DETERRENCE

Background

In spite of the recent and potential steps towards effective strategic arms limitation, the problem remains of assuring that there is an adequate U.S. strategic nuclear force. That force provides a foundation for our national security by providing long-term deterrence against strategic nuclear war.

Soviet Military Trends

The adequacy of the U.S. deterrence force should be viewed against the background of the trends in the Soviet military capability. Secretary of Defense Donald H. Rumsfeld reported to the Congress in his fiscal year 1977 Defense Report:

> . . . it is well to consider some conspicuous trends in Soviet military capabilities—trends that are facts, not projections—before making any judgements about the desirability of increasing U.S. strength:
>
> Over the past decade, Soviet defense spending has been increasing steadily in real terms.
>
> In that same period, the Soviet military establishment (not counting border guards and internal security forces) has expanded by a million men from 3.4 to 4.4 million men.
>
> Between 1965 and 1975, Soviet strategic offensive forces have also increased:
>
> Intercontinental Ballistic Missiles (ICBMs) from 224 to 1,600 (an increase of nearly 1,400);
>
> Sea-launched Ballistic Missiles (SLBMs) from 29 to 730 (an increase of about 700); and
>
> Strategic warheads and bombs, from 450 to 2,500 (an increase of about 2,000).
>
> —The momentum of this buildup shows no sign of slackening. Qualitative improvements continue, such as:
>
> The development of four new ICBMs, two of which are currently being deployed with multiple independently targetable reentry vehicles (MIRVs);
>
> The production of a new generation of Ballistic Missile Submarines (SSBNs), one version of which has deployed with a new 4,200 mile range SLBM;
>
> Accuracy improvements which could give their ICBMs a significantly reduced circular error probable (CEP);
>
> Large MIRVs with high-yield warheads; and
>
> Development of a mobile IRBM (in the form of the SS–X–20).[1]

[1] Donald H. Rumsfeld, Annual Defense Department Report, fiscal year 1977, p. 3.

The long-range meaning of these trends is uncertain. What is certain is that the Soviet Union continues to develop, after SALT I, a massive, modern, high quality strategic capability. This obviously necessitates U.S. action to assure that our basic goal of deterrence and international stability remain viable.

Objectives For U.S. Strategic Nuclear Force

The size and composition of the U.S. strategic nuclear force is dependent upon its basic objectives. Secretary Rumsfeld defined these as:

> The basic objectives for the strategic nuclear forces are four in number:
>
> To have a well-protected, second-strike force to deter attacks on our cities and people, at all times;
>
> To provide a capability for more controlled and measured responses, to deter less than all-out attacks;
>
> To insure essential equivalence with the USSR, both now and in the future, so that there can be no misunderstandings or lack of appreciation of the strategic nuclear balance; and
>
> To maintain stability in the strategic nuclear competition, forsaking the option of a disarming first-strike capability and seeking to achieve equitable arms control agreements where possible.[2]

Adequacy of U.S. Strategic Forces

The adequacy of U.S. strategic forces has become during the year a volatile political subject. The Joint Committee on Atomic Energy is in no position to make any definitive judgment on the issue. The judgment of Secretary Rumsfeld, as he reported to the Congress is appropriate:

The Strategic Nuclear Situation

> As of today, the U.S. strategic nuclear forces retain a substantial, credible capability to deter an all-out nuclear attack. Their ability to execute controlled and limited responses is being enhanced as a result of improvements in plans, command and control, and the increasing flexibility being introduced into the Minuteman force. However, there remains a basis for concern in three areas, and that concern will deepen in succeeding years.
>
> First, the submarine and bomber forces are aging; at the same time the Soviets are improving their antisubmarine warfare capabilities and their defense against bombers.
>
> Second, there is an increasing possibility that major asymmetries will develop between U.S. and Soviet strategic offensive forces because of the momentum in Soviet offensive and defensive programs, and that the Soviet strategic capability will come to be seen as superior to that of the United States.

---

[2] Ibid., p. 5.

Third, a continuation of current Soviet strategic programs—even within the constraints of SALT—could threaten the survivability of the Minuteman force within a decade. If that should be allowed to happen, our ability to respond to less-than-full-scale attacks in a controlled and deliberate fashion would be severely curtailed, and strategic stability could be endangered.[3]

U.S. Strategic Nuclear Force Programs

In response to the Soviet military trends and to meet the strategic force objectives, the Department of Defense has requested in its FY 1977 budget funds for the following major aspects of the strategic nuclear program:

At the present time, one component of the Triad—the Minuteman force—is essential to both diversity and control. And, it is the Minuteman force that the increasingly sophisticated Soviet ICMB capability threatens to neutralize eventually. Accordingly, we must move steadily, but with deliberation, to retain the option to move toward a more secure basing mode for the ICBM force.

The Trident program is necessary in any event to replace the aging SLBM forces in the mid-1980s. We are also concerned with possible Soviet advances in anti-submarine warfare capabilities, and the quieter Trident boat with its longer range missiles hedges against any significant Soviet ASW gains.

The B–1 bomber represents a suitable successor to the B–52. Its ability to penetrate at low altitude and high speed will allow us to offset any Soviet air defense improvements. Most important the B–1's advances in structural design, hardening against nuclear effects, and the ability to fly out from under nuclear attack, with minimum warning time, would represent a valuable improvement in survivability.

The M–X missile, either in fixed silos or in a multiple-aim-point mode, with a combination of larger throw-weight and increased accuracy, should improve on the desirable features of the Minuteman, without Minuteman's potential vulnerabilities. We should develop M–X at a rate that would allow us to supplement part or all of the Minuteman force in the 1980s, should that prove necessary.

In order to keep open the option to diversify further the nuclear forces, exploiting new technology in which we lead the Soviets, we are developing two cruise missiles—sea-launched (SLCM) and air-launched (ALCM).[4]

U.S. Strategic Force Issues

The Congress considered these U.S. strategic programs during the Defense Authorization and Appropriation legislation for fiscal year 1977. Each proposed project centers on the nuclear weapon as the essential ingredient. There is strong feeling within the Congress that it is not in the best interest of the Nation to continue such a wide ranging strategic research and development effort as long as detente

[3] Ibid., p. 8.
[4] Ibid., p. 8.

seems to be working and as long as there are current arms limitation negotiations. Others believe that the Soviet Union may be continuing their strategic development program for their own reasons—those which are related to gaining an evident strategic superiority in order to maximize their political advantage. They generally believe that in the uncertainty of the post-Vietnam environment and the absence of successful conclusions of current arms limitation negotiations, it is appropriate for the U.S. to continue this strategic research and development program.

The decisions are being subjected to a very rigorous series of hurdles in the Congress, depending upon the threat at the time, the progress or lack of progress in negotiations, the vulnerability of existing systems as compared to Soviet progress, and, as a most important factor in this time of economic uncertainty, the cost of systems.

The Nuclear Weapon Stockpile

There has been a lingering impression within the Congress that the size of the U.S. nuclear weapons stockpile grows with each year. The Joint Committee on Atomic Energy is insistent that the stockpile be no larger than necessary for valid security reasons and has consistently encouraged the Administration to reexamine its rationale for the size of the nuclear weapons stockpile with an objective of reducing levels where possible.

Appendix D–1 is the Department of Defense response to this issue which was raised during March 1976 hearings by the Joint Committee on the nuclear weapons budget request of the Energy Research and Development Administration. This indicates that the stockpile leveled off in the 1960's and, shortly thereafter, took a downward trend as strategic missile forces started to replace a portion of the inventory of strategic aircraft and bombs. The stockpile continued to decrease beyond 1973 due to the retirements of CONUS air defense weapons and retirements of some obsolete tactical weapons being replaced by new conventional and modernized nuclear weapons.

A second indication is that the general trend in U.S. strategic weapons has been to reduce the megatonnage. This resulted from the U.S. decision to place multiple warheads on each strategic missile, improved accurancy of missile guidance systems, and the higher alert status of missiles allowing a reduction in bombers with their larger yield bombs.

The third indication is that the Soviet Union retains a megatonnage advantage over the U.S. forces by a ratio of over 3 to 1. However, DOD believes that overall qualitative factors compensate somewhat for this large Soviet throw-weight advantage.

Nuclear Policy

During the past year some Members of the Congress have become concerned over the national policies which govern the control and possible use of nuclear weapons in the disasterous event that deterrence should fail. For example, several committees of both bodies have examined the "first-use" doctrine. Nuclear strategy is a particularly important and an especially sensitive area of concern. It is apparent that the Congress intends that all confusion in this issue be dispelled so that there is no question about the absolute control over the employment of our strategic and tactical nuclear force.

DEPLOYMENT OF U.S. NUCLEAR WEAPONS

Background

United States foreign policy for five successive Administrations has provided for the deployment of U.S. nuclear weapons abroad as a part of the "shield if a nuclear power threatens the freedom of a nation allied with us or of a nation whose survival we consider vital to our security" (from the Foreign Policy Report of 1971). Thus, consistent with that policy and as a result of NATO and bilateral agreements, the United States has deployed for many years a large number of nuclear weapons overseas. Most were deployed initially during 1958–1964. In Europe, several Secretaries of Defense have revealed that there are about 7,000 nuclear weapons. In the Pacific there has been no such announcement, although it is widely known that nuclear-capable Army, Navy and Air Force units are located in that area. In addition, the Navy has many nuclear weapons capable ships (in addition to the Polaris/Poseidon submarine fleet) which are at sea.

Classification Policy

The U.S. Governmental security policy regarding nuclear weapons locations is that it will neither confirm nor deny the existence or location of U.S. nuclear weapons located anywhere. In part, this is at the request of the nations where the weapons are deployed, since in most nations the existence of U.S. nuclear weapons within their borders is a difficult internal political issue. Thus they generally have requested that the United States not declassify the fact that U.S. nuclear weapons are located in their specific nation—even though the evidence that they are there is obvious and generally known by their population. Nevertheless, there is strong feeling by many members of the Congress that the continuation of that classification, as well as other facts about the nuclear capability, is not in the best interest of the Nation.

Nuclear Weapons in The Pacific

The main purpose of U.S. nuclear weapons in the Pacific area is to provide a support to the deterrent posture needed to protect certain nations from aggression—particularly Japan, South Korea and Taiwan. With the concern over the possible proliferation of nuclear weapons nations, these deployed U.S. nuclear weapons are also an important element in convincing these nations that they need not develop their own independent nuclear weapons capability in order to assure their national security. This has become particularly important in view of the strong and growing Japanese nuclear power capability. In spite of this, there is a strong belief in the Congress (especially by the Joint Committee on Atomic Energy) that the Administration should make a careful review of the number and location of weapons in the Pacific area and reduce them in every instance where new security situations make that possible.

Nuclear Weapons at Sea

The nuclear weapons aboard Naval vessels include bombs which could be delivered by aircraft from carriers, warheads for missiles to defend the fleet from air attack, anti-submarine warfare weapons and torpedoes. The fact that a ship is capable of carrying nuclear weapons does not guarantee that those weapons are, in fact, aboard ship.

Nuclear Weapons in Europe

BACKGROUND

As a result of NATO and bilateral agreements since 1954, and at the request of our NATO allies, the United States has deployed about 7,000 nuclear weapons in Europe. Most weapons were deployed in the 1958–1964 time frame and have remained essentially at the 7,000 level since 1964. These weapons are considered by our NATO allies as an integral element of the NATO defense plans, as a major contribution of the United States to the defense of Europe, and as an indicator of the United States continuing commitment to NATO.

ALLIED PARTICIPATION

The heads of the NATO governments understand clearly the meaning and purposes of these weapons and have full opportunity to examine in detail each year their implications for the defense of Europe. The Nuclear Planning Group (of which the U.S. Secretary of Defense and other key NATO Ministers of Defense are members) meet several times a year to discuss nuclear weapons matters of the Alliance. Allied officers in the NATO commands and staffs participate in detail on nuclear weapons planning and operational matters. Through bilateral agreement, authorized by the Congress, most NATO nations have formed and trained their own nuclear weapons delivery units. The United States is required by the Atomic Energy Act of 1954, as amended, to hold in its custody and possession the nuclear portion of the weapons and will make them available to the Allied delivery units only when both the President of the United States and the NATO command channels direct.

NATO NUCLEAR CAPABILITY

The nuclear capability of NATO consists of three separate elements: the U.S. weapons stored for delivery by U.S. units; the U.S. weapons stored for delivery by Allied units; and, British weapons stored for delivery by British units. In addition, the growing French nuclear capability, both strategic and tactical, could become available for the defense of Western Europe in the event of a major Warsaw Pact aggression should that nation so decide. However, there are no known plans for that event. The U.S. nuclear weapons capability in Europe includes the ability to deliver the about 7,000 nuclear weapons by Army, Navy, and Air Force delivery systems. These systems are listed in Appendix D–4. However, the key systems for the Navy are aircraft carrier-based fighter bombers, and Poseidon submarines assigned to NATO support. The Air Force major systems are FB–111 and F–4 aircraft. The major Army systems include the Pershing and

Lance missiles, nuclear artillery, a decreasing number of Nike Hercules air defense missiles, and some atomic demolition munitions.

SOVIET NUCLEAR CAPABILITY IN EASTERN EUROPE

The Soviet Union also has a major nuclear capability in the Eastern European area. Some unclassified sources estimate that Warsaw Pact forces could be capable of using up to 3,500 nuclear weapons in any attack against NATO. They consist mainly of the FROG rocket, the SCUD missile and bombs upon aircraft. Further, they still retain 600–700 intermediate range ballistic missiles in the Soviet Union which are targeted upon Western Europe. It has been reported to the Congress by the Secretary of Defense in his Defense Report of fiscal year 1977 that:

> . . . The Soviets continue to increase the flexibility with which they can use nuclear weapons. Older tactical aircraft are being replaced with modern dual-capable fighters and fighter-bombers such as the swing-wing Fitter C, Fencer and Flogger. Further, the quantity of delivery systems has been increasing. They are improving their theater-wide command, control and communications systems. A new and unique Soviet development is a MIRVed mobile IRBM, the SS–X–20 . . . . The SS–X–20 uses the first two booster stages of the SS–X–16 ICBM. It is believed that the system will be deployed in a mobile or road-transportable mode.[1]

Thus, the Soviet Union has reached a condition of nuclear parity for theater nuclear weapons in Europe. This fact has had a significant influence upon NATO strategic policies and in the NATO positions during the MBFR talks in Vienna.

WEAPONS REDUCTIONS

The major congressional issues related to deployed nuclear weapons continue to be centered upon the nuclear weapons in Europe. The Joint Committee has been concerned that these weapons be adequately secured, are capable of survival under nuclear or non-nuclear attack, and remain unquestionably responsive to the direction of political authorities. The Joint Committee supports reduction in the number of deployed weapons in Europe as well as in other parts of the world. The DOD consolidation of nuclear weapon sites, noted in the next section on Security, is a positive step of improving both the security and survivability of these weapons.

The Department of Defense has been able to achieve some reductions in deployed tactical nuclear weapons through modernization. For example, the Honest John rockets and Sergeant missiles in Europe have been replaced on a less than one-for-one basis by the Lance tactical missile system. Other reductions may be possible by assigning former nuclear weapons targets to the new precision guided missiles, or "smart bombs," which proved to be effective in both Vietnam and the October 1973 Middle East War. The Joint Committee, since 1973, has expressed to DOD the need to proceed with greater energy this program to replace nuclear weapons with improved

[1] Donald H. Rumsfeld, Annual Defense Department Report, fiscal year 1977, p. 102.

conventional weapons. This continues to be a fruitful area of gaining further reductions without a loss of NATO combat capability.

The current U.S. proposal to reduce the U.S. nuclear weapons in Central Europe, as a part of the MBFR negotiations in Vienna (discussed earlier in the Arms Control section), is also an effective manner of reducing the deployed weapons. However, the careful effort to gain NATO allied approval for that proposal illustrates the sensitivity of this subject. The allies continue to view both U.S. force levels and deployed nuclear weapons as an indication of the strength of the U.S. commitment to the defense of Europe. Thus, all reductions of U.S. nuclear weapons in Europe must be carefully coordinated with our European allies.

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SECURITY OF NUCLEAR WEAPONS

Background

A basic foundation of our national security is the large stockpile of nuclear weapons stored in many locations both within and outside the continental United States. Nuclear weapon storage sites vary in size from large depots where hundreds of bombs and warheads of various types are stored to small sites having a small number of warheads in support of a single nuclear delivery unit.

Congressional Interest

The Congress, mainly through the Joint Committee on Atomic Energy, has expressed great concern over maintaining adequate security over U.S. nuclear weapons, and especially those weapons which are deployed in overseas areas. Members of the Joint Committee and its staff have visited a number of locations where weapons are stored, have observed the conditions, and have made recommendations to the President and to the Secretary of Defense. These actions have caused some upgrading of security conditions. However, the consensus within the Joint Committee on Atomic Energy is that there still is more progress that should be made.

Other committees of the Congress beside the JCAE have become interested in the security of deployed U.S. nuclear weapons. The Senate Foreign Relations Committee has made several investigations of this matter over the past five years. The House Appropriations Committee has expressed an interest through its Military Construction Subcommittee. The Senate Armed Services Committee took special note of this matter in its consideration of the FY 1977 military construction authorization.

The Threat

The security threat to our nuclear weapons are of several types. The Department of Defense in its Nuclear Weapons Security Primer, dated April 1, 1975, categorizes these threats as follows:

(*a*) Covert Penetrators. This threat would arise from the desire of a hostile element to infiltrate personnel into a nuclear weapon site for the purpose of gaining intelligence information on our weapons or sabotaging them.

(*b*) Unauthorized Use. Only the President can authorize use of nuclear weapons. Our security measures must be designed to preclude use of a nuclear weapon by our own people until Presidential approval has been granted.

(*c*) Psychotic Attack. This threat could result from one of our own people becoming deranged and attempting destruction or unauthorized detonation of one or more nuclear weapons.

(*d*) Host Nation Takeover. Some U.S. nuclear weapons have been earmarked for use by our allies. Physical security of these weapons is provided by the host country although custody is maintained by small U.S. detachments. In addition, weapons are stored in the sovereign territory of allied nations for use by U.S. forces, if required. Thus, changes in attitudes of allies must be evaluated carefully and on a continuing basis so that appropriate action can be taken as warranted should this threat arise.

(*e*) Terrorist. International terrorism, during the past few years, has demonstrated that it is a force to be reckoned with. Because of the violent, efficient, and rapid manner by which terrorist acts have been executed, terrorism poses a potential threat to our weapon stockpile and is driving most of the new security upgrade efforts.

Congressional Security Concerns

First, ever since the terrorist action during the 1972 Olympics at Munich, the potential threat to U.S. deployed nuclear weapons due to terrorist attack has been of increasing concern to the Congress.

Second, there has been a new danger to security of weapons which might be deployed in vulnerable and outlying areas in countries where the political situation may become unstable. Circumstances exemplified by the Greco-Turkish war over Cyprus in 1974 demonstrate how the complexion of an alliance may change rapidly.

Third, and directly stemming from the second concern, is the new circumstance posed by the strong possibility of the inclusion of communists in the governments of NATO. The 1974 coup in Portugal was the first indication of this problem. In order to protect nuclear weapon planning data, Portugal was excluded from meetings of the NATO Nuclear Planning Group (NPG)—of which it was a member at the time. With the high possibility of communists joining the Italian Government, this same question will be raised, since Italy is a member of the NPG. There will also be growing concern over the deployment of any U.S. nuclear weapons which may be located in Italy.

Fourth, a further threat has disturbed the members of the Joint Committee on Atomic Energy in relation to many of the weapons which are deployed in the forward areas of Europe. The procedures for getting United States and NATO governmental approval for those weapons to be fired in the event of a major Warsaw Pact aggression are long and cumbersome. There is concern that those weapons might be overrun and captured before there is authority granted to fire. It is hoped that modifications to deployment plans will help ease that problem.

Security Improvements

The basic security problem with deployed U.S. nuclear weapons can be solved in several ways:

(*a*) Improvement of the physical security at the existing sites.

Partly because of Congressional pressures and partly because of action by the Secretary of Defense, the Department of Defense has

increased their funding requests to upgrade the physical security of the U.S. nuclear weapon sites. The funding levels have been:

Fiscal year:	*Millions*
1972	$3.8
1973	9.6
1974	12.0
1975	29.6
1976	93.9

DOD projected funding level:

Fiscal year:	*Millions*
1977	$135.8
1978	76.7

(*b*) Withdrawal of weapons from more vulnerable areas to more secure areas.

(*c*) Total withdrawal of weapons from nations where political conditions have become unstable.

The withdrawal of some or all of the nuclear weapons would be, obviously, an action which would have very important political implications relating to U.S. security assurances to other nations, impact on the Mutual and Balanced Force Reduction negotiations, and nuclear proliferation aspects. Nevertheless, it is important that there be a full review of deployed nuclear weapons and consequent readjustments where it appears that weapons no longer are essential for their defense mission. Just as has been done in the case of the U.S. MBFR proposal to reduce U.S. nuclear weapons in Europe by 1,000 weapons, as reported by the press, any proposal to reduce deployed weapons would have to be coordinated thoroughly with our allies.

Department of Defense Actions

In the period 1972–1975, the Department of Defense has taken increased cognizance of the security problem. Appendix F–1 is the extract from the Department of Defense Annual Report for FY 1977 which describes DOD on-going programs to improve the peacetime security and storage of nuclear weapons. These include:

(*a*) Review of present storage sites on a case-by-case basis to determine if they can be closed or consolidated with other sites. As a result of this review, the DOD has reported to the Joint Committee on Atomic Energy that there was a net closure of 97 nuclear sites during calendar years 1974 and 1975 and that it is anticipated that there will be even further reductions as a result of other on-going actions.

As noted in the June 9, 1976, Conference Report on the FY 1977 Military Construction Authorization Act, H.R. 12384, the Conference Committee took the following note of the Senate Armed Services Committee recommendation:

Nuclear weapons security

For the past several years the Congress has expressed concern over the security of nuclear weapons. Last year Congress authorized over $56 million for this purpose and this bill contains $117,746,000.

In its report on this bill, the Senate directed the Department of Defense to report to the Armed Services Committees of the Senate and House of Representatives on a bimonthly basis for the next two years on upgrading nuclear weapons storage sites. The House argued that a bimonthly report requirement was too frequent to be meaningful and suggested that the report be submitted semi-annually, and the Senate agreed. The conferees again expressed serious concern with this situation and insisted that upgrading the physical security of our nuclear storage facilities be given top priority by the Department.

* * * * * * *

Various locations—nuclear weapons security, $37,075,000

The Senate added $7,375,000 for nuclear weapons security and the House added $1,920,000. The conferees looked at these differences and, after discussing the great importance of improving nuclear weapons security, the House receded and agreed to the Senate figure, bringing the total authorized for the Navy for this purpose to $37,075,000.[1]

This is a firm indication of the desire of the Congress that the storage-site improvements be completed as rapidly as possible.

(*b*) Improvement to Physical Security of Storage Sites. During 1975, the DOD conducted a site-by-site survey of each nuclear weapon storage site to determine what military construction is required to upgrade the physical security of these sites. Based upon that survey, the DOD has projected the expenditure of the following military construction money for site upgrade:

Fiscal year:	*Millions*
1977	$135.8
1978	76.7

In its consideration of the authorization for the fiscal year 1977 Military Construction budget, the Senate Armed Services Committee was particularly concerned that this site security upgrade program be completed as expeditiously as possible. It included in its report 94–856 to accompany S. 3434 the requirement that:

> . . . In order to permit the Congress to stay abreast of the progress of this program, beginning immediately, the Department of Defense is directed to report to the Armed Services Committees of the Senate and the House of Representatives on a bimonthly basis for the next two years the following information, as a minimum, on each site in the nuclear storage site upgrade program:
>
> 1. Estimated cost (current working estimate)
> 2. Design start date (actual or estimated)
> 3. Construction award date (actual or estimated)
> 4. Completion date (actual or estimated)

Further, the Committee added to the funding authorization of $7,375,000 to accelerate the Navy's nuclear weapon security program.

(*c*) Improvement of the Personnel Reliability Program. The DOD revised its DOD Directive 5210.42 which updated the policy governing the Personnel Reliability Program which:

> Provides for medical evaluation of nuclear weapons personnel by physicians.

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[1] H. Rept. No. 94–1243, Conference Report on H.R. 12384, Military Construction Authorization Act, 1977 (appearing on p. H5499, Congressional Record, June 9, 1976).

Expedites reassignment of disqualified personnel.

Establishes specific reliability factors.

Applies the program to DOD contractors who are associated with nuclear weapons as well as DOD personnel.

Requires an updated investigation for those persons who have a break in service of 12 months or whose Background Investigation was completed in excess of 5 years prior to assignment to nuclear duties.

Appendix F–2 is a summary of the total number of persons in the DOD Personnel Reliability Program and includes the actions during calendar year 1975 on disqualifications.

(*d*) Improvement of DOD Nuclear Weapon Security Procedures. In 1975 the DOD published the Nuclear Weapon Security Manual which provided additional guidance on the security procedures to be employed at storage sites and alert areas and while weapons are in transit.

While these actions are helpful, it is certainly the intent of the Congress that further improvements be pursued vigorously.

SAFEGUARDS

Background

The rapid growth of the nuclear power industry (domestic and international) with the consequent increase in the worldwide availability of plutonium, coupled with the recent rise in terrorist activities, has dramatically increased national concern over the possible diversion or theft of nuclear materials, sabotage of nuclear facilities, or other acts of terrorism.

ERDA and NRC Safeguard Activities

The Energy Research and Development Administration and the Nuclear Regulatory Commission are the key U.S. agencies involved in the nuclear safeguard program. In general, ERDA is responsible for the research and development aspects; NRC is responsible for the licensing aspects and the adequacy of the licensees' abilities to assure the necessary protection. Appendices G–1 and G–2 are statements provided the Joint Committee by the NRC and ERDA respectively as descriptions of their safeguards program. It is apparent that during the past year both agencies have made major progress in establishing valid and effective safeguards programs.

Discussion of Issues

DOMESTIC

Some essential issues involved in maintaining an effective domestic nuclear safeguards program are as follows:

1. Are shipments of critical amounts of nuclear materials adequately protected?
2. Are the procedures for accounting for nuclear materials through the nuclear fuel cycle sufficiently accurate to assure that there has been no diversion into unauthorized channels?
3. Are the nuclear facilities of commercial licensees and Government agencies adequately protected against terrorist attack or other incidents?
4. Are the costs of an adequate safeguards program maintained within the limits of economic benefits?
5. Is there adequate availability of intelligence to warn of potential nuclear domestic safeguard incidents?
6. Is there a realistic capability of responding to specific safeguards problems?

INTERNATIONAL

The international safeguards issues center on the basic issue of nuclear proliferation and the control of nuclear exports as discussed in those earlier sections of this report. In addition, the issue of pre-

venting international acts of nuclear terrorism is paramount. Appendix G–3 is a statement by ERDA on the U.S. efforts during the past year to cooperate with other nations and the International Atomic Energy Agency on the safeguards of nuclear material. It indicates that the U.S. is playing a major educational role with other nations to assure an adequate world-wide sensitivity to nuclear safeguards problems and to encourage effective multinational solutions to those problems. While these efforts are helpful, the Congress is concerned that they continue and that effective agreements result which could reduce the potential dangers.

ADEQUACY OF IAEA SAFEGUARDS

A fundamental issue of safeguards is the effectiveness of the International Atomic Energy Agency's Safeguards program. Appendix G–4 is a description by ERDA of the IAEA safeguards program which concludes that within the prescribed limitations of the IAEA Statute, the Agency has an effective safeguards program. However, there is a strong belief within the Congress that the role of the IAEA needs to be strengthened and expanded. Some members have questioned the fundamental effectiveness of the sanctions that should be imposed should the IAEA detect a diversion of nuclear materials. Senator Stuart Symington visited the IAEA June 29–July 3, 1975, and on July 15, 1975, reported to the Senate on his visit [Appendix A–3]. He noted that enforcement of sanctions would evolve upon the United Nations. Based upon his experience as a recent Congressional Representative on the U.S. Delegation to the U.N., Senator Symington observed, "I found the possibility would be remote indeed that the U.N. would enforce sanctions against a country which obtained nuclear weapons."

A corollary to adequacy of IAEA safeguards is how they compare with U.S. domestic safeguard requirements. Appendix G–5 is a comparison made by ERDA which notes that whereas IAEA standards are intended to *detect* diversion of nuclear material, the U.S. domestic requirement is to *prevent* such diversion. From this difference stems U.S. pressures to expand the IAEA role in the area of physical security of nuclear installations and material. However, due to problems of great sensitivity in other sovereign nations on matters of internal security, such expansion may be difficult to achieve.

APPENDIX A

Nuclear Proliferation

Appendix A–1

NONPROLIFERATION TREATY, JULY 1, 1968

Treaty on the Nonproliferation of Nuclear Weapons, July 1, 1968 [1]

The States concluding this Treaty, hereinafter referred to as the "Parties to the Treaty",

Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples,

Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war,

In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons,

Undertaking to cooperate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities,

Expressing their support for research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system, of the principle of safeguarding effectively the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points,

Affirming the principle that the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties to the Treaty, whether nuclear-weapon or non-nuclear-weapon States,

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to participate in the fullest possible exchange of scientific information for, and to contribute alone or in cooperation with other States to, the further development of the applications of atomic energy for peaceful purposes,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament,

Urging the cooperation, of all States in the attainment of this objective,

Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapon tests in the atmosphere in outer space and under water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end,[2]

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[1] ACDA files, The U.S. Senate approved the treaty on Mar. 13, 1969, by a vote of 83 to 15. Treaty signatories as of June 27, 1969, are listed *post*, p. 871.

[2] *Documents on Disarmament, 1963*, pp. 291–293.

Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a treaty on general and complete disarmament under strict and effective international control,

Recalling that, in accordance with the Charter of the United Nations, States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations, and that the establishment and maintenance of international peace and security are to be promoted with the least diversion for armaments of the world's human and economic resources,

Have agreed as follows:

Article I

Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Article II

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

Article III

1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.

2. Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material expecially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this article.

3. The safeguards required by this article shall be implemented in a manner designed to comply with article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international cooperation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this article and the principle of safeguarding set forth in the Preamble of the Treaty.

4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

Article IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

Article V

Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a nondiscriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development, non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of

non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

ARTICLE VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

ARTICLE VII

Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

ARTICLE VIII

1. Any Party to the Treaty may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one-third or more of the Parties to the Treaty, the Depositary Governments sall convene a conference, to which they shall invite all the Parties to the Treaty, to consider such an amendment.

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.

3. Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realized. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

ARTICLE IX

1. This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland and the Union of Soviet Socialist Republics, which are hereby designated the Depositary Governments.

3. This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositaries of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of ratification. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to January 1, 1967.

4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.

6. This Treaty shall be registered by the Depositary Governments pursuant to article 102 of the Charter of the United Nations.

Article X

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

Article XI

This Treaty, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

In witness whereof the undersigned, duly authorized, have signed this Treaty.

Done in triplicate, at the cities of Washington, London and Moscow, this first day of July one thousand nine hundred sixty-eight.

NPT Parties and Non-Parties

The 98 States which have ratified, acceded to, or succeeded to the NPT are:

Afghanistan
Australia
Austria
Belgium
Bolivia
Botswana
Bulgaria
Burundi
Cameroon
Canada
Central African Republic
Chad
China, Republic of
Costa Rica
Cyprus
Czechoslovakia
Dahomey
Denmark
Dominican Republic
Ecuador
El Salvador
Ethiopia
Fiji
Finland
Gabon
Gambia
German Democratic Republic
Germany, Federal Republic of
Ghana
Granada
Greece
Guatemala
Haiti
Holy See
Honduras
Hungary
Iceland
Iran
Iraq
Ireland
Italy
Ivory Coast
Jamaica
Japan
Jordan
Kenya
Korea, Republic of
Khmer Republic
Laos
Lebanon
Lesotho
Liberia
Libya
Luxembourg
Malagasy Republic
Malaysia
Maldives Republic
Malta
Mali
Mauritius
Mexico
Mongolia
Morocco
Nepal
Netherlands
New Zealand
Nicaragua
Nigeria
Norway
Paraguay
Peru
Philippines
Poland
Romania
Rwanda
San Marino
Senegal
Sierra Leone
Singapore
Somalia
Sudan
Swaziland
Sweden
Syria
Thailand
Togo
Tonga
Tunisia
USSR
United Kingdom
United States
Upper Volta
Uruguay
Venezuela
Viet-Nam
Western Samoa
Yugoslavia
Zaire

The 12 States which have signed but have not ratified the NPT are:

Barbados
Colombia
Egypt
Indonesia
Kuwait
Panama
Sri Lanka
Switzerland
Trinidad and Tobago
Turkey
Yemen Arab Republic
People's Democratic Republic of Yemen

The States which have not signed the NPT are:

Algeria
Argentina
Brazil
Burma
Chile
People's Republic of China
Cuba
Equatorial Guinea
France
Guinea
Guyana
India
Israel
Malawi
Mauritania
Monaco
Niger
North Korea
North Vietnam
Pakistan
Portugal
Qatar
Saudi Arabia
South Africa
Spain
Tanzania
Uganda
United Arab Emirates
Zambia

Appendix A–3

Statement by Senator Stuart Symington, in the U.S. Senate, concerning "The Nuclear Safeguards Delusion", July 15, 1975

[Excerpted from the Congressional Record July 15, 1975, page S 12610.]

Mr. President, accompanied by staff members George W. Ashworth of the Senate Committee on Foreign Relations, David A. Raymond of the Senate Committee on Armed Services, and Gen. Albion W. Knight, Jr. of the Joint Committee on Atomic Energy, I visted Vienna and Geneva June 29 through July 3 during the Senate recess.

On this trip, we explored a number of questions concerning recent developments in the strategic arms race, including the spread of capability to make nuclear weapons in presently nonnuclear states. Those related areas can only become increasingly important to our own security as well as the rest of the world.

In Vienna, we held extended talks with officials of the International Atomic Energy Agency—IAEA. This Agency is considered the principal "safeguards" instrument of the Non-Proliferation Treaty to insure that nuclear technology is not diverted to weapons development.

Unfortunately, the position of U.S. Permanent Representative to the IAEA has been vacant for some months; and in light of recent developments, let us hope this does not reflect any loss of interest in the vital work this Agency was set up to perform.

In Vienna, we also met with United States and foreign delegates to the talks on Mutual Balanced Force Reductions—MBFR. The U.S. delegation is ably led by the Honorable Stanley Resor.

When we arrived in Geneva, a new round of the strategic arms limitation talks—SALT—was just getting underway, this after many postponements; and we held discussions with members of the U.S. negotiating team headed by the Honorable U. Alexis Johnson.

Based upon our deliberations at IAEA, MBFR, and SALT, it is increasingly apparent that the control of nuclear proliferation and related aspects of arms limitation not only is loose, but is slipping. It appears that the prospects for meaningful arms control have become increasingly doubtful.

The more I read the papers on this subject, the more I am impressed that what we are talking about is form, not substance.

The discussions held in Vienna with officials of the IAEA were of special interest in light of the multibillion dollar nuclear "deal" which had just been concluded between the Governments of West Germany and Brazil. Earlier we were informed that this arrangement was first offered to the United States but rejected by this Government because we would not allow the export of a complete fuel cycle—including

enrichment and reprocessing facilities—which could be used to make nuclear weapons.

Now West Germany, however, a country which has both signed and ratified the Non-proliferation Treaty—and thereby committed itself "not in any way to assist" another state to manufacture nuclear weapons—has agreed to transfer to Brazil—a country which has not even signed, let alone ratified, this treaty—all the material, equipment and technology needed to establish and operate a full nuclear weapons fuel cycle.

This agreement marks the first scale of a complete fuel cycle to any nation. Note that in this case, the recipient nation is in the Western Hemisphere and possesses extensive uranium deposits.

The German-Brazil "deal" will enable Brazil to produce nuclear weapons for its own possible use as well as for sale to other countries, including Germany.

Questioning of this dangerous arrangement is reinforced by divergent testimony presented to the Senate Foreign Relations Committee by people high in the State Department as against statements released by the West German Government. Last month State testified that the United States protested the deal, tried to stop it but could not succeed. Later during that same month, however, the Chancellor of West Germany, Helmut Schmidt, stated at a news conference in Bonn that the American Government "has not expressed a word of criticism to us."

In any case, and regardless of who is responsible, for the first time a country which has refused to either sign or ratify the Non-Proliferation Treaty now has been able to purchase a complete nuclear fuel cycle which can be used for a weapons development program.

This demonstrates that the countries which are capable of supplying nuclear technology have been either unable or unwilling to reach a significant agreement among themselves with respect to the transfer of this technology to nonnuclear states. More than that, it is becoming increasingly clear that commercial interests now prevail over consideration of nuclear weapons control. This sale by West Germany to Brazil confirms that fact.

Despite the IAEA inspection system, which over recent years people had been led to believe would check the spread of nuclear weapons, today that agency actually furnishes no safeguards to check any such spread. During our visit to the IAEA, we found that this agency does little more than monitor roughly the flow of nuclear materials. It has no power of either prevention or enforcement.

In this regard, the following conclusion of the Acheson-Lilienthal report of 1946 would appear to still hold true today: "A system of inspection superimposed on an otherwise uncontrolled exploitation of atomic energy by national governments will not be an adequate safeguard."

Any enforcement of sanctions in the case of safeguard violations detected by the IAEA—that is, diversion of nuclear fuel from peaceful to weapons-development purposes—would appear to be the responsibility of the United Nations. As a congressional representative on the U.S. Delegation to the last U.N. session, however, I found the possibility would be remote indeed that the U.N. would enforce sanctions against a country which obtained nuclear weapons.

73-642—76——4

Turning to the subject of the present SALT negotiations, our visit to Geneva confirmed that progress in SALT has been slow and tortuous. Summed up, the two parties have not yet achieved any meaningful control over the nuclear arms race; and the pace of new weapons technology, as illustrated by the socalled "cruise missile," along with additional precision-guided vehicles, seems to be outstripping efforts to curb the arms race.

A great scientist once characterized the nuclear picture of the 1950's as "two scorpions in a bottle."

Today there are six scorpions in that bottle, and we now know that soon there will be many more; so it is becoming increasingly apparent that what any two countries may decide will not necessarily be decisive, no matter how many nuclear weapons they may possess.

Any country which possesses nuclear weapons could provide a grave threat to virtually any other country, a condition which implies future danger to all nations.

In this nuclear age, while the spread of atomic weapons continues unchecked, the assurance of any nation that it would not seek nuclear weapons—or would only seek nuclear explosive devices for "peaceful purposes"—may only reflect its current public attitude. But, as Lord Palmerston once observed regarding the behavior of nations, "we have no enternal allies, we have no perpetual enemies. Our interests are eternal and perpetual and those interests it is our duty to follow."

In this connection, consider that 30 years ago our two chief enemies in war were Germany and Japan, and two of our strongest allies were the Soviet Union and China; therefore any nation would be foolish to consider present alinements and present appearances of mutual goals to be a permanent state.

In any case, the nuclear genie is now out of control, and the number of scorpions continues to grow.

The Subcommittee on Arms Control, International Organizations and Security Agreements of the Senate Foreign Relations Committee, which I chair, will resume hearings on nonproliferation this Friday, at which time we will receive testimony from the Honorable Dwight Porter, director of International Government Affairs of the Westinghouse Electric Corp., and former Permanent Representative to the International Atomic Energy Agency in Vienna.

It was reported in the press that Brazil had originally approached the Westinghouse Corp. for the nuclear arrangement it was finally able to receive from West Germany.

I would estimate that since World War II we have probably put over $200 billion into the defense of West Germany which, of course, means also the defense of Europe; and yet they accepted the arrangement which this Nation refused to give the Brazilians, and in doing so they have set up a nuclear power in the Western Hemsiphere.

Our hearings will examine various aspects of this arrangement.

We shall also examine broadly new developments in the commercial nuclear field, such as the Common Market's reported turn to the Soviet Union for enriched uranium which it has in the past purchased almost exclusively from the United States.

Appendix A–4

Address by Senator John O. Pastore, to the Fiftieth American Assembly, concerning "Safe and Reliable Nuclear Power: Promises Fulfilled—Challenges Remaining," April 22, 1976

[Excerpted from the Congressional Record, Apr. 26, 1976, page 5870.]

I deeply appreciate your invitation to share this occasion with you. I am sure that your Association and those who are here this evening are dedicated to the betterment of community and country and are deeply concerned with the destiny of America.

In this Bicentennial Year, our citizens are able to look back with pride on the almost unbelievable accomplishments of America.

One such accomplishment occurred in 1942 when Enrico Fermi and his co-workers unlocked the secrets of the atom by achieving the first self-sustained fission chain reaction.

This was civilization's most exciting scientific discovery.

It unleashed a physical force greater than that discovered by man in all of recorded history.

In the short time of just nearly thirty-four years since Fermi's historic achievement, nuclear power has emerged as the dominant factor in the great human equation and as undoubtedly the single most important factor determining the course of international relations.

This is so because the atom can be used as a weapon to destroy the human race or it can be used to provide a safe, reliable and boundless source of usable energy to the benefit of hopeless and distressed people everywhere on the planet.

In view of the origin of its birth, it is natural that the world thought then, and even now, of atomic energy primarily as a weapon of destruction—Fermi and his associates and the thousands of dedicated workers who followed them were aware of the other side of the atom—the vision of the untold benefits to our civilization from its peaceful use.

For the past twenty years, I have been a member and Chairman of the Joint Committee on Atomic Energy. My attraction to this responsibility has been the peaceful atom. As I remarked at the celebration of the 25th Anniversary of the Atomic Energy Act, if my responsibility as a member of the Committee was only to make a better and bigger bomb, then I would have had no part in it. Unless we can put this tremendous power at the disposal of man for his enrichment, I must say tonight that it would be far better if this great achievement had never occurred.

The fact is that the peaceful atom, primarily through the safe and reliable generation of electricity, offers an opportunity to help achieve what I believe is the fundamental desire of people everywhere—the vision for a better life for our children and those who follow.

At the outset, I emphasize safety because safety is an indispensable essential in nuclear power.

Although I will have more to say about safety later, the fact is that reactors of the type now in use in this country have proven themselves as safe, reliable and economic sources for the generation of electricity. The commercial nuclear safety record is excellent.

But we all know that the benefits of nuclear power necessarily involve some risks, as does every other industrial activity, including every known means to generate electricity in large amounts.

While past experience, including that gained during the demonstration stages of a new technology, provides a large measure of assurance and confidence that the risks are minimized and should be acceptable, this experience can not, and must not be allowed to reduce the emphasis and eternal vigilance which is being placed on safety and environmental considerations.

JCAE EXPERIENCE

I do not reach any conclusion about reactor safety based on any pretension or expertise of my own.

I am not a scientist or an engineer. My conclusion is based on the favorable operating experience to date and the overwhelming views expressed in testimony before the Joint Committee in hearing after hearing conducted during the past twenty-five years.

Members of this committee have studied these matters over the years with the intensity of a physician studying a patient with a rare or puzzling ailment. I might also add that the committee itself has been studied by some with the same intensity and interest.

This is as it should be in view of the tremendous responsibility in the field of atomic energy of the Joint Committee to the Congress and to the American people.

The accomplishments which have already been achieved in the use of commercial nuclear power and its promise for the future did not just happen. It required a long and difficult effort requiring close cooperation and partnership between the Executive Branch, the Congress, universities, national laboratories and industry.

Over the years the Joint Committee has recommended to the Congress and the Congress has enacted legislation authorizing and appropriating funds for research, development and demonstration of commercial nuclear power.

These programs—once established by the Congress—were followed closely by the committee. Battle after battle was fought with budgeteers who short-sightedly tried to slash a modest program that has already saved our people hundreds of millions of dollars and, in the long run, will save billions of dollars.

Nuclear power has been developed—to the point where it is now generating large quantities of safe, reliable, and economic power—by a few short years of dedicated effort and modest, well-paced demonstration programs, most through cooperative arrangements

with industry. The total Government costs for these programs have been approximately $2½ billion. This contrasts with our present annual costs of over $25 billion for imported oil.

I don't want to leave you with the impression that correct decisions were made regarding all of these problems. I will frankly tell you later on where I believe programs, perhaps, could have been handled a little differently.

My point simply is that any long-term member of the Joint Committee—even though not a scientist or engineer—certainly is in a position to evaluate thoroughly the public policy issues relating to the benefits of nuclear power and the paramount importance of safety in the commercial applications of that technology.

I would not want any citizen to doubt for one moment, regardless of what past and present critics might have said or written, that the Joint Committee would tolerate anything less than the highest quality regulation of nuclear power and full and open communication to the American people on the risks involved.

COMMERCIAL NUCLEAR POWER

Several very important factors influenced progress on the way to the development and demonstration of safe and competitive nuclear power.

First of all, industry was being asked to participate with the Government in a new technology under a new law, the Atomic Energy Act of 1954, which provided for the first time the authority under which industry could participate in the commercialization of the atom.

Another factor was the abundance of natural resources with which this country was blessed. Many did not realize then that the resources were finite, and that liquid and gas fossil fuel supplies were rapidly being diminished. There was, therefore, a lack of sense of urgency to meet the challenges of source from a new technology.

Radiation from fallout of atmospheric weapons tests was the safety concern of that era. The primary criticism, however, probably came from those who became disillusioned because their once extravagant hopes for the atom were not realized fast enough.

I, too, was concerned about the progress being made in the development of commercial nuclear power. In the Fall of 1961, I met with President Kennedy and discussed with him the importance of having a definitive assessment and understanding of our domestic needs and prospects for atomic power.

Thereafter, President Kennedy asked Dr. Glenn T. Seaborg, then Chairman of the Atomic Energy Commission, to take a new and hard look at the role of nuclear power in our economy. The study was submitted to President Kennedy on November 22, 1963. This authoritative report provided an overall comprehensive plan for the development of nuclear power in the United States.

The report concluded in part:

"Nuclear energy can and should make an important and, ultimately, a vital contribution toward meeting our long-term energy requirements, and, in particular that: The development and exploitation of nuclear electric power is clearly in the near- and long-term national interest and should be vigorously pursued."

This conclusion has been emphatically confirmed by the significant events affecting our available energy sources which occurred subsequently.

The report laid out four basic objectives which, in the succeeding years, have charted the course for the development of nuclear power in this country. The report called for:

"The demonstration of economic nuclear power by assuring the construction of plants incorporating the presently most competitive reactor types.

"The early establishment of a self-sufficient and growing nuclear power industry that will assure an increasing share of the development costs.

"The development of improved converter and, later, breeder reactors to convert the fertile isotopes to fissionable ones, thus making available the full potential of the nuclear fuels.

"The maintenance of U.S. technological leadership in the world by means of a virgorous domestic nuclear power program and appropriate cooperation with, and assistance to, our friends abroad."

EARLY PROGRESS IN THE DEVELOPMENTAL EFFORT

The year 1957 is significant in the development of commercial nuclear power because it was then that the Government-owned demonstration plant of 60 megawatts was placed in operation in Shippingport, Pennsylvania.

This was the Nation's first large scale civilian nuclear reactor. It has operated safety and reliably in the succeeding two decades.

The years 1957 to 1963 saw the initial operation of several demonstration nuclear plants with power outputs of 200 megawatts, such as the Yankee Reactor in Massachusetts and the Dresden Reactor in Illinois. They are still operating with a safe record.

I wish to reiterate that these were demonstration plants, a primary purpose of which was to learn more about the art of nuclear technology.

From the construction and operation of such plants have come much experience and data which provide additional support for the extraordinarily high degree of safety which is present.

The next phase in the demonstration program involved plants above 400 megawatts, such as the Connecticut Yankee plant and the San Onofre, California, plants, which also have operated safely.

The increase in plant size to the 400 megawatts range, together with competition between the two largest atomic equipment companies, enabled nuclear powerplants to compete with fossil fueled plants without Government assistance.

It became clear in 1965 that the utility industry considered competitive nuclear power near at hand.

The first large wave of nuclear powerplant orders began in 1965 and continued until by the end of 1974 some two hundred and eleven plants, with a total capacity of around 205,000 megawatts, had been ordered. Virtually all of the capacity ordered involved reactors ranging in size from 400–1300 megawatts.

The significant increase in the number and size of nuclear reactors is cause for particular vigilance in their design and construction so they will operate with a high degree of reliability.

A number of these plants have been successfully placed in operation. Around seventy of them are under construction. As a result primarily of recession-related reductions in electricity use and the general conditions of the money-market, approximately 23 of these plants were cancelled outright and nearly a hundred have been deferred.

I wrote each of the utility executives involved in the cancellations and deferrals so that I and the committee would know whether those actions were based in any measure on any lack of confidence in either the safety or reliability of nuclear technology.

The responses were unanimous in expressions of complete confidence in the safety and reliability of nuclear power.

As far as I have been able to determine, the commitment to nuclear power in the long run remains a reality. What has happened is that the tremendous and sudden escalation in the nuclear orders starting in 1965 from almost zero has now settled down to more realistic and orderly demands.

Although I deeply regret the economic conditions which caused this to happen, the stretch-out may be beneficial if the additional time is used by both the Government and industry to proceed with research and development programs which should further improve the reliability of reactors.

ECONOMIC BENEFITS BEING RECEIVED FROM NUCLEAR POWER

Substantial economic benefits are already being gained from the number of nuclear plants now in operation. A 1,000 megawatt nuclear plant saves the equivalent of approximately 10 million barrels of oil annually.

In 1974 less than 50 nuclear plants supplied just under 8 per cent of the electricity generated in the United States. That use of nuclear power saved customers approximately $810 million in fuel costs. It saved the equivalent of approximately 185 million barrels of oil or some 45 million tons of coal.

The benefits were even greater in 1975. Approximately 57 nuclear plants supplied around 9 per cent of the electricity generated in this country. They saved over $2 billion in fuel costs and over 200 million barrels of oil or some 55 million tons of coal.

In certain parts of the country, nuclear plants generate even greater percentages of the electricity used with corresponding benefits to the regions served by those plants.

In 1975 nuclear power counted for 35 per cent of the electricity generated by that utility which services the Chicago metropolitan area. During 1975 nuclear power saved that utility approximately 37 million barrels of oil.

Nuclear plants generated 28 percent of the electricity used in New England in 1975. If those plants were not in operation, New England utilities would have had to burn an additional 34.9 million barrels of oil at a cost to the consumer of $400 million.

The Energy Research and Development Administration estimates that there are about 93,000 people working in the private nuclear industry. There are about another 50,000 construction workers involved in building nuclear power plants. An additional 110,000 people are employed by ERDA's contractors in nuclear related activities. Approximately $100 billion has been invested to date by the private sector in commercial nuclear power.

PROJECTIONS FOR THE FUTURE

According to some of the most current projections, nuclear energy could represent about 26 per cent of electric power generation in 1985. However, the nuclear power projections account for a 30 per cent smaller contribution than earlier projections due to the utility cancellations and deferrals caused primarily by uncertainty in demand growth, financial difficulties and the long lead-time involved in bringing a nuclear power plant into operation.

In addition to the 58 nuclear plants now licensed to operate, there are now 69 nuclear power plants for which a construction permit has been granted. The Nuclear Regulatory Commission estimates that in 1976 operating licenses will be issued for about 10 units and that construction permits will be issued for about 34 units.

There are presently seventy-one additional plants which are under construction permit review, 17 are on order, and 21 others committed by utility announcements of intent. All of these figures represent a total of 236 plants with a capacity of 236,000 megawatts—a little more than one-half of nuclear power commitments in the world.

By the middle of the next decade, if all of these plants are on the line to generate electricity, they should over their lifetime represent the equivalent of about 65 billion barrels worth of petroleum generating capacity. This is about six times the estimated reserves of the Alaskan North Slope. Even at the present price of oil per barrel, the cost of such an oil replacement, assuming its availability, will be approximately $25 billion annually.

The availability of these nuclear plants would reduce our dependency on oil imports which have increased substantially since the oil embargo in 1973 to the point where they are sometimes in excess of domestic production.

Moreover, their availability would result in the conservation of petroleum, the supply of which is finite and which has a multiplicity of essential uses other than to produce electricity.

WORLD WIDE COMMITMENT TO NUCLEAR POWER

Other industrialized countries of the world now have some 273 nuclear power plants in operation, under construction or on order which would produce a total of 165,000 megawatts of electricity.

Even though we possessed a monopoly on the technology at the close of World War II, this science did not remain in our domain. In the Geneva Conference of August 1955, I saw the surge of a new spirit of atomic development. Here scientists were gathered from every corner of the earth exploring what to do to make the atom a servant of man for a brighter and better future. The Russians were there with evidence of their atomic power reactor which they said had been in operation for more than a year. The British were there also and their showing was centered around atomic power to generate electricity.

Even then, there was an awareness of a keen competitive interest in the atom by our friends as well as our adversaries.

Since those early days, particularly when President Eisenhower delivered his speech in December 1953 before the General Assembly of the United Nations urging the establishment of the International Agency for Atomic Energy, the development of atomic energy for

peaceful purposes essentially became and has subsequently remained a vital part of our foreign policy.

As long as it so remains, it behooves this Government to work with private industry and with other countries in the development of this source of power so that we can win and hold the hearts and minds of people all over the globe who look to us for help and for hope.

It was my privilege to be selected by President Eisenhower as a delegate to the U.S. Mission to the Tenth General Assembly of the United Nations. It was also my privilege to advance, on behalf of our Government, the draft resolution that led to the creation of the International Atomic Energy Agency in 1957.

In 1966, I introduced S. Res. 179, the first Senate Resolution supporting the nuclear Non-Proliferation Treaty. That resolution passed the Senate by a vote of 84–0.

On July 1, 1968, President Johnson signed the Treaty on Non-Proliferation. That document, together with a strong International Atomic Energy Agency, provide an international framework under which the countries of the world can act in partnership to achieve the benefits of the atom while doing everything possible to assure that atoms for peace are not diverted to atoms for war.

Our policy from the start recognized that there would be in the world an increasing number of nuclear supplier and recipients and, therefore, it would be in this Nation's interest to develop a safeguards system administered by a strong international organization of broad membership.

The fact is, however, that the power of international control of sovereign countries is not without practical limitations. But, the answer is not to abandon the sought-after goal of international control but to do all within our power to assure that it is strong and effective.

Providing international control to assure that the benefits of the peaceful atom are achieved without proliferation of nuclear weapons represents one of the greatest challenges which faces the leaders of the world today. This is a challenge which I do not believe will be met by any precipitous action on the part of our Nation. It is one which will require constant vigilance and patience in trying to have the leaders of the world, especially those of the supplier nations, exercise their influence and restraint.

Such an approach through communication and understanding, seems to me is the course which is most likely to assure that the human mind which created this technology—so has the wisdom to understand the absolute necessity of the need to prevent the proliferation of nuclear weapons.

This is exactly what Senate Resolution 221, which I introduced and which the Senate passed on December 12, 1975, urges our President to do.

The leaders of the world must realize that the atom is with us for good or for evil and that only in the hands and minds of humans can this miracle of science remain a positive contribution to the human race.

OTHER CHALLENGES WHICH REMAIN

In view to the current energy situation which this country now faces and will face for years to come, it would seem to me that greater reliance on nuclear power is essential.

Our domestic supplies of oil and natural gas are being rapidly diminished. The United States will need increasing supplies of all available sources of energy, and clearly it would seem that both the coal industry and the nuclear industry will have their hands full in meeting their full share of the demand.

Nevertheless, there are challenges that are now being faced by the nuclear industry. Perhaps the most important of these challenges is the public acceptance of nuclear power.

From the beginning of the commercial nuclear power program, the Congress has insisted that the regulation of the commercial nuclear industry be conducted openly, with opportunity for public participation. This is as it should be in a society of free people—for without public support, little can really be accomplished.

Although the accomplishments through the dedicated efforts of many people can be pointed to as a source of pride, in many parts of the country there are aggressive campaigns being waged against the continued development of commercial nuclear power.

The points about nuclear power which seem to continue to worry people the most are:

1. What is the possibility of a very serious accident to a nuclear plant and how serious will the consequences be to the public?

2. What will be done about radioactive wastes and, in view of the long periods of its radioactivity, will we ever be able to dispose of this waste without a continuing concern for its potential effect on public health and safety?

3. Can the nuclear material, such as plutonium, be safely handled and adequately safeguarded so that it cannot be diverted by terrorist groups?

These are all legitimate questions to which the public is entitled to have answers.

Our committee, too, has been concerned with these questions and we have continually and constantly urged upon the various agencies to come up with definitive plans and adequate budget requests to solve the problems.

Public debate began with some intensity for the first time in the late 1960's and has continued. Because of the questions being asked, I decided several years ago to discuss these problems with Dr. James Schlesinger, who was then the distinguished Chairman of the Atomic Energy Commission.

I suggested that a study be conducted of reactor safety which would render the answers to these and other questions to the American public. I also suggested that prompt consideration be given to the establishment of a separate independent agency to regulate the commercial atom so that there would no longer be a basis for the charges being made that the quality of regulation was being influenced by promotional considerations.

A new independent Nuclear Regulatory Commission came into being on January 19, 1975, under the aggressive leadership of its first Chairman, William A. Anders.

One of the very first actions of that new Commission required safety inspections which resulted in the shutdown of certain nuclear power plants because of the discovery of a hairline crack in some of the piping.

I publicly commended the Commission for its action. Frankness must always prevail on such issues and the facts developed so that the American people will have a clear understanding of what actually is involved from the standpoint of risks to them.

That and subsequent actions by the Nuclear Regulatory Commission have demonstrated to my satisfaction that this country has a strong agency which is carrying out its responsibilities to regulate the commercial atom.

I might add that the regulatory system established by the Congress in the Atomic Energy Act of 1954 provides for multiple reviews by qualified experts with opportunity for public participation before independent licensing boards.

The agency's decision is subject to judicial review. I am pleased to note that the quality of the regulatory decisions which have been reviewed by the courts has not been found by them to be lacking.

As far as I am aware, no other industry anywhere in the world has been the subject of more research, more scrutiny and regulation than has nuclear power technology. This, of course, is as it should be in view of its complexity and the awesome power which is involved.

Another striking point in my judgment is that the development and application of nuclear power is one of the first, if not the first, major example of considering in detail environmental and public health issues in advance of industrial application.

The regulatory system complies with both the letter and the spirit of the National Environmental Policy Act of 1969. The track record, in other words, has been good.

With the establishment of the Nuclear Regulatory Commission and the Energy Research and Development Administration, substantial additional emphasis has been placed on research and development to assure that the quality of the regulatory review and the safety of the technology are even further improved.

As long as this technology is used there will always be a continuing search for additional information so that the technology which has already been demonstrated to be safe can be further understood and improved.

As far as public acceptance is concerned, full and frank information to the public on the risks involved is the most essential ingredient for insuring the ability of a democratic government to deal with this technology.

I believe that the public can now have confidence that the commercial nuclear power program is being closely supervised and regulated with every reasonable assurance of safety.

Of course, no one can say that this or any other technology is completely without risk. We all knew this from the very beginning. Any new accomplishment which holds promise of substantial benefits also comes with some risks. The Congress insisted, however, from the outset that safety was of paramount importance. Without safety there is no question but that the economic benefits of the atom should not and can not be available for our people.

The regulatory system which the Congress has established for commercial nuclear power was tested recently with the allegations made by four individuals who formerly occupied positions of responsibility in and out of Government.

I promptly decided that a complete and exhaustive investigation should be made of the allegations and that a formal report should be made to the Congress and the American people upon the completion of that investigation.

Although I do not for a moment question the sincerity of these individuals, I can say now after listening to their testimony and that of officials of the Nuclear Regulatory Commission and the independent Advisory Committee on Reactor Safeguards that the established regulatory system can and does work.

If those allegations or any future information reveal that the system should be strengthened or changed, this I assure you will be done promptly.

The high quality of regulation needed for nuclear power as well as public confidence in the regulatory system is, of course, enhanced by responsible and constructive criticism of that system.

The nuclear Regulatory Commission and the Joint Committee must always listen to such criticism and act promptly and responsibly to correct any deficiencies. All public officials should welcome this participation as a helpful contribution to the carrying out of their responsibilities under the law.

CONCLUSION

Nuclear energy must be made to be the salvation of free nations in helping to alleviate the hunger and the hopelessness of distressed people everywhere.

Many challenges have been successfully faced—domestically and internationally—in only a very short time.

There are still areas in which the Government, in cooperation with industry, must accomplish even more. This is needed, not to benefit utilities or to benefit industries, but needed in the public interest. The people of this Nation are the ultimate beneficiaries.

The discovery of this new technology occurred at a time when the world's deepest despair was with man's utter helplessness against the furies and hates of man for man. Out of that crucible the beneficial uses of the technology have come at a time to offer an abundant source of energy. The human race now has within its power the opportunity to determine whether this technology shall carry man on to greater achievements or whether it shall be a means of destruction.

These tremendous accomplishments did not just happen. There was a lot of hard, patient work by trained and dedicated people. I have every reason to believe that the challenges which we now face, both domestic and international can be met by similar dedicated efforts by, people of good will everywhere.

Appendix A–5

Statement by Senator Stuart Symington, in the U.S. Senate, Concerning "Nuclear Proliferation and Counterforce," October 22, 1975

[Excerpted from the Congressional Record, Oct. 22, 1975, page S 18464.]

Mr. President, owing to the important votes of today on energy issues, I canceled a planned trip to Boston. Dr. Paul Doty had asked me to talk to the Harvard University program for science and international affairs.

In my prepared remarks to this group, I was emphasizing that the current nuclear weapons spread represents the most important security issue of our day; also that the now recommended counterforce nuclear policy, one of "limited nuclear war," threatens to undercut any chance for strategic balance.

This prepared talk was given to the press.

Mr. President, I ask unanimous consent that it be printed in the Record.

There being no objection, the talk was ordered to be printed in the Record, as follows:

Nuclear Proliferation and Counterforce

It is a pleasure to address this distinguished group today at the invitation of my good and valued friend, Paul Doty.

I was asked to speak on two subjects: (1) nuclear proliferation, and (2) counterforce.

In this nuclear space age, the policies of the nuclear powers about the use of nuclear weapons can only relate to the fact that many more nations will soon have the capacity to develop such weapons; in fact on Friday of this week our Subcommittee on Arms Control will be taking testimony from the Pentagon on the defense implications to this country of the growing number of nations currently developing nuclear arms capabilities.

As to proliferation, it is a fact that time is fast running out for establishing any meaningful control over these weapons. One can no longer deny that the growing worldwide "Atoms for Peace" trade is rapidly spreading the capability to use nuclear energy for war.

Whether it is still possible to delay, let alone prevent, further proliferation is at best uncertain.

Since the Baruch Plan of some 29 years ago, no equally bold initiative designed to control the spread of these weapons has been advanced. But in the intervening years we have seen the number of states that have exploded nuclear devices grow from 1 to 6; and there are many additional nations which currently either possess untested nuclear weapons, or have the capability to produce them.

As a result of the establishment of the international Atomic Energy Agency (IAEA) in 1957, and also the Treaty on the Non-Proliferation of Nuclear Weapons of 1968, it was felt this Agency and this Treaty provided some hope of preventing proliferation. but that hope would appear to be fading.

Many nations, including three members of the so-called "nuclear club," will not support the Non-Proliferation Treaty. Some important countries which supply nuclear technology, as well as other which receive it, have asserted they will not ratify this Treaty.

Moreover, what is generally not understood is that by ratifying the Non-Proliferation Treaty nations "undertake to facilitate, and have the right to participate in, the fullest possible exchange of (nuclear) equipment" (Article IV) and then can withdraw, without penalty, upon giving notice "three months in advance" (Article X). This means that any nation can first sign said Treaty, receive all the technology and equipment necessary to produce nuclear weapons, and then withdraw from the Treaty after only ninety days notice.

Limitations on the effectiveness of the IAEA have also become increasingly apparent. Its so-called "safeguards" against proliferation are based exclusively on inspection and monitoring procedures, conducted at the forebearance of states; and it has no authority to prevent these states from using nuclear materials for weapons development.

It is interesting to recall the conclusion of the Acheson-Lilienthal Report of 1946, which report in turn led to the Baruch Plan. The latter plan emphasized that there could be no effective control over nuclear weapons proliferation under a system which relied "only" on inspection, but which at the same time allowed allowed "an otherwise uncontrolled exploitation of atomic energy by national governments."

Let us note also the results of a recent study sponsored by the Energy Research and Development Administration (ERDA). That study states that, for both financial and political reasons, the IAEA will be unable to carry out even its limited inspection tasks; important because over the next 15 years the nuclear market it expected to expand to more than 100 times its present size.

Nor would there appear to be any decrease in these problems; in fact the reverse. As example, we all now know about the recent multi-billion dollar nuclear contractual agreement between Germany and Brazil, which was signed last July. This agreement gives Brazil a "complete nuclear fuel cycle," i.e., all the facilities required to develop and produce nuclear weapons. This is the first time in history any such transaction has taken place; and Brazil has extensive deposits of uranium.

Both countries involved have sought to allay criticism of the agreement by noting the IAEA inspection provisions which they say they will apply to it. But these provisions could not prevent a Brazilian regime—perhaps not the present one—from developing nuclear weapons; nor could they prevent Brazil from selling such weapons to other countries, including Germany.

In a world in which such transactions are talking place, how can there be any real control over proliferation.

I have spent most of my life in the arms field—and am now convinced that this is the most important security issue of our day. Perhaps this is now being recognized. Representatives of seven nuclear supplier nations—Britain, Canada, France, West Germany, Japan, the Soviet Union, and the United States have have over a period been meeting in semi-secrecy in London.

The 1946 Acheson-Lilienthal Report recommended an international agency with powers to regulate the enrichment and reprocessing operations that are essential for the production of nuclear weapons. This premise, that true control over nuclear proliferation requires some form of meaningful regulation over the nuclear fuel cycle, as distinguished from any system based solely on inspection, is now being revived.

A Congressional Resolution introduced last July by Senator John Pastore, the able and experienced Chairman of the Joint Committee on Atomic Energy, urges, "that the United States should take the lead in seeking agreement for the development of regional, multinational, rather than national, centers to undertake enrichment and reprocessing activities, in order to minimize the spread of technology which could be used to develop nuclear weapons."

Last month, in an address by Secretary Kissinger before the United Nations, this country formally proposed the establishment of such "multinational regional fuel cycle centers." In that address the Secretary asserted that these centers would reduce the financial burden of nuclear power for a growing number of nations; and would also help curb nuclear weapons proliferation.

For myself, however, I question whether a practical and meaningful plan for multinational centers could actually be accomplished. Not only would it require an unprecedented degree of cooperation among the world's nuclear supplying nations; but it would also require a commitment to dependence upon non-national facilities by those nations seeking energy self-sufficiency, not to mention other countries with clear-cut ambitions to achieve nuclear military power.

It is logical to believe the latter would desire to possess, on a national basis, all those facilities necessary to produce such weapons.

It is now clear that nuclear power is to become an essential source of energy for a growing number of countries. It would also appear clear that any effort to curb the use of this new power for energy could result in moving forward the development of nuclear weapons in more countries.

The paradox the world faces today, therefore, would appear to be that the development of nuclear power for peaceful purposes, bearing in mind the "form as against substance" control of the IAEA, could actually be a plan for furthering the possibility of nuclear war; and how to provide this energy source without further loosening the reins of control over nuclear weapons development is the greatest problem facing all peoples today.

We can only go so far in strengthening any inspection and monitoring system of the IAEA; nor is the world about to establish any international policy structure with meaningful authority over the action of national governments.

Nevertheless the proposal for multinational nuclear centers, even with its obvious shortcomings, is a proposal which deserves further study, even though the diverse interests of all nations in this nuclear age will not be easily reconciled; and even though any arrangements for multinational nuclear centers would at best provide but a partial solution.

Let me now turn to the question of counterforce, reviewing briefly the history of this concept, and where it would appear we stand today.

As we all know, the term "counterforce" connotes an attack against an adversary's military capability, particularly his strategic military capability. Typical targets comprise stragegic bombers and their bases, ballistic submarines, ICBM silos, air defense installations, command and control centers, nuclear stockpiles, etc.

Counterforce is thus to be distinguished from planned attacks against civilian population and industrial centers of an adversary. The latter have been termed "countervalue" targets.

During its formative stages—1945 through the early 1950's—United States nuclear strategy concentrated on "countervalue" targeting rather than on "counterforce;" for the Soviet Union had yet to deploy any intercontinental nuclear delivery systems. The term "massive retaliation" came into use during this period, because we knew the enemy had little if any capacity to retaliate in kind.

When in the 1950's the Soviet Union deployed long-range strategic bombers—Bear, Bison—United States policy shifted to counterforce concepts designed to knock out attacking aircraft. "Massive retaliation" then had a two-fold purpose (1) to destroy counterforce targets; (2) to destroy civilian populations and industry.

In the early 1960's, after the Cuban missile crisis, the Soviet Union expanded its own strategic missile force sufficiently to constitute an "assured destruction" capability against this country. As of that point, our nuclear policy became based on the so-called "balance of terror," with population targeting as the primary deterrent.

In 1969, in his first foreign policy address to the Congress, President Nixon posed the question whether, if deterrance based on "balance of terror" failed, the President would be left with only the option of destroying the cities of a major aggressor, with knowledge that millions of Americans would die in return.

The strategy advocated by his Administration retained "assured destruction" as a central component, but also emphasized the feasibility of a range of options that depend on the ability to fight a "limited nuclear war."

What concerns many of us about the recent emphasis on such limited nuclear conflict, however, is that the United States already has adequate power to destroy targets on a selective basis.

Under these circumstances, the concept of emphasizing increased flexibility to fight a "limited nuclear war" appears to undercut deterrence rather than strengthen it; for it would make such a war seem to be an acceptable option.

Without any sure means of capping escalation should such a "limited" conflict occur, it would in all probability result in a full nuclear exchange, at the expense of civilization.

Last month, the Senate Foreign Relations Subcommittee on Arms Control released a study of the effects of limited nuclear war. This study contained new Pentagon statistics on estimated civilian fatalities resulting from such a war.

The Pentagon now concedes that tens of millions of Americans, as well as 800,000 Canadians, could die in any such war. By coincidence this 800,000 figure was the estimate of American fatalities first presented by the Pentagon last year.

After our Subcommittee's request for further study, the estimate of 800,000 total United States fatalities, resulting from attacks against only our ICBMs, has now been revised to 22 million.

Note that this figure still does not include the tens of millions more casualties which would result from fires, long term radiation exposure, the loss of communications, hospital facilities, and so forth.

In any case, this new information raises serious questions about any limited nuclear war doctrine. Apparently that doctrine was formulated before the Department had solid information about its possible price to society in lives and treasure.

Appendix A–6

Statement by Senator Stuart Symington, in the U.S. Senate, Concerning "The Nuclear March to Armageddon," April 14, 1976

[Excerpted from the Congressional Record, Apr. 14, 1976, page S 5720.]

Mr. President, for some years I have been presenting to the Senate the greatest security problem this country and the world face today—the steady increase in the number of nations capable of building nuclear weapons.

Others are also bringing attention to that danger. The distinguished senior Senator from Connecticut, Senator Ribicoff, wrote an interesting and constructive article which appeared in the New York Times on March 26.

I ask unanimous consent that this article, "Trading in Doom," be included in the Record at the conclusion of these remarks.

At one time, the United States was the only nation possessing nuclear weapons. Later they were produced and tested by the Soviet Union; and thereupon the resulting danger was described as "two scorpions in a bottle."

Now we know there are at least six scorpions in that bottle, in all probability more; and it would seem certain that, in the not too distant future, there will be many more.

Under the atoms for peace effort, nuclear know-how and equipment has been spread throughout the world.

Many of the nations we have helped are today themselves nuclear exporters; and unfortunately some of their policies in this area have not been as restrictive as ours.

Over strong objections from many countries, including the United States, two nations in particular, France and Germany have sold reprocessing and enrichment facilities; that is, have sold for profit the means to produce nuclear weapons.

It has been suggested that in order to force these countries to stop these dangerous exports, the United States stop supplying them with enriched nuclear fuel. Whether such action would achieve its desired purpose is questionable, however, because France and West Germany already have access to other nuclear fuel facilities, and are capable of expanding their own.

France possesses its own enrichment plants. Germany, through its involvement in the Uranium Enrichment Corporation—Urenco—a consortium of British, Dutch, and German interests, also has access to nuclear fuel.

Moreover, for some time Germany has been working on the so-called Becker nozzle process, a possible addition to the enrichment art.

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So while a ban on nuclear fuel to those two nations may have a short-term impact, it would not appear to achieve its desired effect. Moreover it could result in both countries acquiring larger uranium enrichment facilities of their own, thereby becoming ever greater nuclear competitors of the United States.

Let us note also that such a ban could violate certain provisions of our own adherence to the Nonproliferation Treaty, as well as agreements with Euratom. In addition, it might violate other specific contracts with foreign utilities.

The organization often cited as the possible cure-all for nuclear proliferation is the International Atomic Energy Agency—IAEA—with its headquarters in Vienna.

That Agency, however, has neither the authority nor the capability to do the job the world has been led to believe it is doing—namely, stopping proliferation.

The IAEA can posssibly detect, but cannot prevent, the diversion or theft of nuclear material to weapons development. It is strictly an inspection and accounting organization for the nations under its jurisdiction, by virtue of their membership in the Nonproliferation Treaty, or their adherence to the terms of certain commercial nuclear contracts.

IAEA could well be useful to verifty honesty—but it cannot stop a nation that is bent on obtaining nuclear weapons.

Under the IAEA charter, sanctions are the responsibility of the United Nations. That latter organization, however, would not appear either determined, or equipped to deal with the problem.

So far as the IAEA is concerned, the way that organization recently handled a series of important developments illustrates its inherent weakness, and makes one wonder whether it is more interested in promoting, rather than preventing, nuclear proliferation.

As but one example: A letter from the Energy Research and Development Administration—ERDA—to the Joint Committee on Atomic Energy discusses some of the proceedings of the IAEA's Board of Governors meeting held last February 24–25. The two most important topics discussed at this meeting were the safeguards agreements to be applied to the sale of a "complete nuclear fuel cycle" to Brazil by West Germany, and the sale of a plutonium reprocessing plant to Pakistan by France.

The dangers inherent in these two deals were and are obvious. They were widely publicized in the press.

Nevertheless, we are told there was little or no discussion of these dangers at the IAEA Board meeting.

Possibly this was because, surprising as it may sound, that Board has no authority to judge the merits of a transaction let alone to prevent dangerous transactions from occurring.

Only the presumed adequacy of the so-called safeguards it plans to apply are reviewed by the IAEA Board.

In addition, to the best of our knowledge, the German and French deals in question have not been subjected to review in any other international forum.

After studying this matter over a period of years, it is our considered opinion that any hope for a realistic constraint on nuclear proliferation must begin with open discussions by the supplier nations on the real issues involved.

All we hear about today, however, are secret nuclear meetings, secret nuclear deals, inadequate controls—politics which, in themselves, would appear to defeat the very purpose of preventing further proliferation.

One proposal which would seem to have merit is an agreement among the nuclear supplier nations not to export enrichment or reprocessing equipment to any individual country.

Such action would not deny a nation the benefit of nuclear power through the sale or leasing of nuclear reactors and fuel; but it would arrest the spread of facilities that are essential for nuclear weapon-making. We have it on good authority that the United States, the Soviet Union, and several other supplier nations are willing to accept such a ban; but other countries not only are opposed; they desire to keep their opposition secret from their own people. This of course means from the people of the rest of the world.

That secrecy is totally unjustifiable. In itself it is a growing danger to civilization.

We understand the supplier nations will be meeting again in June for further discussion of these export matters; hopefully to make substantial progress toward a meaningful agreement, openly arrived at and of substance. That would be well, because elimination of this unnecessary secrecy would allow all peoples to understand just what must be accomplished if we are to slow down the current march towards Armageddon.

EXHIBIT 1

[From the New York Times, Friday, March 26, 1976]

TRADING IN DOOM

(By Abraham A. Ribicoff)

WASHINGTON.—Thirty years ago, when Hiroshima and Nagasaki were freshly imprinted on the mind of a war-weary world, Bernard Baruch presented the United Nations with our nation's plan for peacefully harnessing the atom. "We are here to make a choice between the quick and the dead," he admonished. "That is our business."

That is still our business today. The potential for a holocaust-producing showdown between the superpowers is the most immediate nuclear danger, but the greater danger may lie in the spread of nuclear weapons to many nations, even to terrorists, through the export of civilian nuclear technology.

In 1946, the Soviet Union's refusal to restrict its own development of atomic weapons prevented the United Nations from placing all dangerous nuclear activities and stockpiles under international ownership and control. Today, the refusal of France and West Germany to restrict their civilian nuclear exports poses the greatest obstacle to curbing dangerous nuclear trade.

The French and Germans, seeking to pull multibillion-dollar reactor sales away from the United States, offer an option that we do not—the facilities needed by a nation to produce and process its own reactor fuel. The problem is that these facilities—uranium-enrichment and plutonium-reprocessing plants—produce material suitable for making atomic bombs as well as reactor fuel. Therefore, they constitute the essential component of any nuclear-weapons-development program. Furthermore, these facilities are much harder to safeguard against theft than reactors, and they cannot be operated economically except in industrial nations with very large reactor programs.

For all of these reasons. the United States exports reactors and fuel that is unsuitable for weapons-making—but not fuel facilities capable of producing weapons-grade material.

The French and Germans have rejected our proposals for banning the export of nuclear-fuel facilities.

They also have blocked diplomatic efforts to bar nuclear sales to nations that refuse to ratify the treaty for the nonproliferation of nuclear weapons or that refuse to agree to place all their nuclear activities under the safeguards of the International Atomic Energy Agency.

The French and Germans suspect that our warnings about weapon's proliferation are a smokescreen for protecting our pre-eminent nuclear industry. The Germans approved the export of enrichment and reprocessing plants to Brazil as part of a major reactor deal over strong United States objections. But this action came shortly after the West German Government learned that an American company was trying to sell Brazil an enrichment plan—and this at the very time out diplomats in Bonn were saying that policy prohibits such sales.

Similarly, the French are not prepared to forfeit their technological lead in plutonium reprocessing because the United States objects to the export of these plants. France is going ahead with the shipment of such a plant to Pakistan despite our objections.

These exports are particularly dangerous because Brazil and Pakistan, which refuse to ratify the nonproliferation treaty, are free to have unsafeguarded nuclear activities and set off nuclear explosions.

Unfortunately, the United States, as exporter of 70 percent of the freeworld civilian nuclear technology is also the biggest supplier of nations that are treaty signatories. Thirteen of the 29 countries to which we make nuclear sales refused to ratify the treaty—not a good example for the French and Germans to follow. Moreover, our current and planned nuclear exports extend to most countries suspected of having atomic-weapon intentions, among them India, South Korea, Taiwan, South Africa, Brazil, Argentina, Iran, Israel and Egypt.

Our explanation for exporting to nontreaty nations and to otherwise suspect nuclear customers is the same as that of France and Germany: "If we don't, they will." The difference is that we will not export fuel facilities—only reactors.

The United States must persuade France and West Germany not to engage in dangerous nuclear trade. We should set a nonproliferation example they can follow, and we should remind them that they still depend heavily on us for the technology, components, and particularly the fuel used in their own ambitious nuclear programs.

Our greatest, and perhaps last, opportunity for persuasion is immediately at hand. For at least the next four years, the United States and the Soviet Union will be the sole sources of enriched-uranium fuel for France and West Germany. Furthermore, the Russians seem to be as concerned as we are about the spread of nuclear weapons—the one issue on which the two superpowers have a strong identity of interest. It provides an excellent opportunity, therefore, to breathe new life into détente.

However, Secretary of State Henry S. Kissinger refuses to approach the Russians on pointly applying pressure on France and West Germany through the denial of nuclear fuel. I agree with Mr. Kissinger that this would be drastic action—even blackmail—but I also believe that drastic action will not be necessary once it is clear that the United States is prepared to act to stop the spread of nuclear weapons.

Therefore, I propose the following steps for the United States.

1. We should immediately explore with the Russians whether a common position can be reached in support of a ban on the export of nuclear fuel facilities to non-nuclear-weapons countries, and on all nucler exports to non-treaty nations.

2. If a common position can be reached, it should be announced at the next meeting of the nuclear supplier nations, in June, and France and West Germany should be asked to announce their positions.

3. At the same meeting, we should demonstrate our good faith by offering to enter into a cooperative arrangement with the other suppliers, including France and West Germany, that will guarantee each supplier a minimum number of reactor sales a year. A "market share" arrangement among the suppliers may be our best hope for eliminating cut-throat competition in the sale of reactors and for promoting fuel arrangements that will discourage production and stockpiling of weapons-grade material outside the supplier nations.

4. If agreement on strict export controls and market-share arrangements cannot be reached, the United States should announce that future supply of enriched-uranium fuel and of all other nuclear assistance will be made only to nations that joint in meeting these nonprolifertion objectives.

If all else fails, the United States should stop supplying reactor fuel to the Germans and French. This would make them wholly dependent onthe Soviet Union. I do not believe that France and Germany are prepared to rely solely on the Russians.

Appendix A–7

Statement by Senator John V. Tunney, in the U.S. Senate, Concerning "Senate Resolution 415—Submission of a Resolution Relating to the Transfer of Nuclear Material to India," March 26, 1976

[Excerpted from the Congressional Record, Mar. 26, 1976, page S 4384.]

Mr. President, I am submitting today a resolution urging the President to suspend the transfer of certain nuclear materials to India pending a public hearing on the implications of such a transfer by the Nuclear Regulatory Commission and until such time as the dangers posed by such a transfer can be more accurately assessed.

Last month, the NRC announced that it would approve the sale through private channels of 40,000 pounds of enriched uranium for use in the American-built dual reactor complex at Tarapur in India. No hearing was held and no opportunity was presented for interested individuals to comment on the transfer. In response on March 5 a group of concerned citizens led by the Natural Resources Defense Council, the Sierra Club and the Union of Concerned Scientists filed a petition for a public hearing. On March 12, 54 Members of the House of Representatives, led by Congressman Richard Ottinger, followed suit and in a letter to the Commissioner of the NRC requested a delay in the sale until a formal hearing could be held and the potential dangers fully explored. No reply to the request has yet been forthcoming, and administration sources say only that the matter is under consideration.

Mr. President, the transfer of thousands of pounds of nuclear material to India presents grave questions about the viability of our nuclear sales program and about the procedures designed to insure that such transfers are in our national interest. As a member of the Joint Committee on Atomic Energy who has sat through many hearings on the problems of proliferation and nuclear safety, I for one am concerned about the potentially disastrous consequences of such a transfer.

In the first place, while routine inquiries are made of the Department of State by the NRC in its approval process for private sales of nuclear materials, these inquiries are often pro forma, more concerned with the political ramifications of the transfer itself than technical questions concerning safeguards against diversion, theft, terrorism, sufficiency of international inspection, safe operation and and maintenance and return or safe disposition of reactor-produced plutonium. Independent sources are rarely invited to comment on the proposed transactions and hearings to discuss the appropriateness of the transfer are almost never held:

Thus, many of the objections that might otherwise be voiced on nuclear sales are never publicly aired. The Indian deal is a case in point; 40,000 pounds of uranium is enough if enriched to produce

10 Hiroshima-sized nuclear weapons. In addition to that uranium, there are indications that the Indians now possess up to 1,000 pounds of plutonium produced in the Tarapur reactor under Indian control. If reprocessed, this plutonium would be sufficient for 100 additional nuclear weapons. Today—not tomorrow or 10 years from now—but today the Indian reprocessing facility at Trombay has the capacity to produce weapons-grade plutonium. Yet that facility is subject to no international or bilateral controls.

Despite this threat, and despite the fact that the Indians have not signed the Nuclear Nonproliferation Treaty and have exploded a nuclear device, overall implementation of safeguards under the agreement for cooperation with India has been left to the IAEA and U.S. bilateral rights have been suspended. Legally, the ownership rights of the plutonium produced at Tarapur are vested in India and the United States has not required either the return of that plutonium nor its safe disposition abroad. Should India decide to abrogate its responsibilities under the agreement for cooperation there is no guarantee that the United States could ever retrieve the material. This, Mr. President, is a blueprint for disaster.

Beyond the question of the inadequacy of bilateral safeguards, there is a distinct danger that safeguards supervised by the International Atomic Energy Agency may be insufficient to prevent either theft or diversion. According to the petition filed by NRDC, the Nuclear Regulatory Commission has made no independent analysis of and finding regarding the safeguards applicable to special nuclear materials shipped to Tarapur. And while the IAEA has entered in subsidiary arrangements with India which detail the specific safeguards which have been applied, this information has not been made available to the NRC.

Two glaring problems arise. First, as we have seen, not all Indian nuclear installations are subject even to IAEA sareguards as called for in the Nonproliferation Treaty. Because India is not a party to the Treaty, she is therefore free to maintain nuclear facilties which are only partially safeguarded or are totally free of international inspection. The result of this according to NRDC is that India is free to use these facilities for the development of nuclear weapons. Thus, safeguards even when applied to all the special nuclear material utilized at Tarapur are not enough to insure that nonpeaceful nuclear activities are not carried on in India so long as fissionable material from unsafeguarded sources remains free of control and so long as unsafeguarded facilities are available to reprocess special nuclear material diverted from Tarapur.

Second, provisions in article VI(c) of the agreement on cooperation which permits the substitution by India of equal quantities of special nuclear material under the agreement by materials not covered thereunder could be used to divert material from Tarapur to unsafeguarded facilities. Without adequate systems of measurement and inspection, there is no way to know whether this loophole has been used and safeguard provisions thus circumvented.

If these safeguards, be they bilateral or international, cannot be guaranteed, there is a strong possibility that the United States will find itself in violation both of provisions of the Nuclear Nonproliferation Treaty and of the trust of nonnuclear signatories, since article III requires the safeguarding of facilities in nonsignatory states as a

prerequisite for such a transfer of nuclear materials the sale to India may result in an abrogation of our legal responsibilities. The continued shipment of such material to India in the face of her refusal to sign the NPT and the recent explosion of a nuclear device could be interpreted as frustrating the intent of the treaty and sanctioning Indian policies, encouraging other states to follow the nuclear path and discriminating in effect against those who did not.

In light of these serious dangers and the uncertainties surrounding this transfer in particular and others like it, I urge these specific steps: First, the NRC should review its rules for granting export licenses for nuclear sales to make provisions for public hearings in cases of such magnitude and involving nonsignatories to the NPT. Second, I would encourage a delay in this particular transfer until public views can be heard. Third, I believe a more detailed analysis of the impact of the transfer to India and the whole question of the adequacy of safeguards under the agreement for cooperation should be undertaken before this sale is allowed to proceed.

Mr. President, we are faced here with the frightening prospect of contributing inadvertently to the demise of the Nonproliferation Treaty, of encouraging the development of an Indian nuclear capability, and of transferring the capacity to produce over 100 nuclear weapons without adequate safeguards against diversion and misuse of potential weapons-grade material. While I firmly believe in the cause of international atomic energy cooperation, I think this transfer deserves more than the cursory examination that it has received. I urge my colleagues to join me in my effort to delay this sale until some very disturbing questions can be answered.

Mr. Tunney submitted the following resolution:

H. Res. 415

Resolved, Recognizing the grave dangers inherent in the transfer of large amounts of nuclear material to nations not party to the Nuclear Non-proliferation Treaty, nations not permitting inspection by the IEAE at all nuclear facilities, and nations unwilling to accept bilateral controls or safeguards on diversion, safety or use;

Noting that the Government of India has declined to implement any or all of the above measures designed to insure the safety and peaceful use of nuclear materials and has, in the recent past used both derivative materials and technology in the fabrication and testing of a nuclear device.

Realising that over 1000 pounds of plutonium—enough to produce 100 nuclear weapons—have already accumulated at the American-built Tarapur-complex at a time when U.S. bilateral rights under the Agreement for Cooperation with India have been suspended and no clear provisions for the recovery of that plutonium have been made;

Acknowledging American responsibilities to signatory states under the provisions of Article III sections (1) and (2) of the Non-proliferation Treaty requiring that special safeguards be applied to the transfer of all nuclear materials to all facilities in nonsignatory States; and at the same time;

Reaffirming the willingness of the United States to cooperate in peaceful nuclear experiments with nations party to the Non-proliferation Treaty or accepting adequate bilateral and/or international safeguards to insure the safety, security and peaceful use of nuclear materials: Now, therefore, be it

Resolved, That the Senate of the United States urges the President to suspend the planned transfer of 40,000 pounds of enriched uranium to the Government of India until a public hearing on the transfer can be held by the Nuclear Regulatory Commission and until such time as the serious dangers inherent in such a transfer can be more accurately assessed, and provisions made for the disposition of reactor-produced plutonium

Appendix A–8

Statement by Senator John O. Pastore, in the U.S. Senate, concerning "The FRG-Brazil Nuclear Agreement," June 3, 1975

[Excerpted from the Congressional Record, June 3, 1975, page S 9312.]

Mr. President, an article entitled, "Brazil Nuclear Deal Raises U.S. Concern" written by Lewis H. Diuguid appeared in the June 1, 1975, edition of the Washington Post. I ask unanimous consent that the article be placed in the Record in its entirety at this point.

There being no objection, the article was ordered to be printed in the Record, as follows:

Brazil Nuclear Deal Raises U.S. Concern

(By Lewis H. Diuguid)

Brazil has arranged to obtain from West Germany the technology that would give it the capability to produce nuclear weapons, and U.S. officials are concerned that the military-dominated government has decided to opt for the bomb.

Brazilian authorities insist, however, that the sole purpose of the contract with the Germans is to generate electricity.

Neighboring Argentina, with a long-standing nuclear research program, is also thought by some high-ranking officials to have decided to attempt nuclear-weapon manufacture.

Neither South American nation signed the 1970 nuclear nonproliferation threaty, and both appear on lists of countries expected soon to be capable of joining the United States, Soviet Union, Britian, France, China and, since last year, India in the nuclear club.

The development lending immediacy to the Brazilian case is an accord now being completed with the STEAG, AG consortium of Essen for provision of several large nuclear reactors, fuel-processing plants and, most important, a uranium-enrichment plant using a unique process.

Robert Gillette of Science magazine, commenting in the current issue, quotes estimates that the secretive contract will run to $8 billion over the next 10 to 15 years.

It is considered possible that Brazil will pay for the technology with the enriched uranium eventually produced. The vast country has deposits of natural uranium and fissionable thorium, plus the hydroelectric power in large quantity needed for the new enrichment process offered by STEAG, AG.

West Germany will need the enriched uramium for its own nuclear generators but it lacks cheap electricity needed for the STEAG, AG production process on which it is banking. The present gaseous diffusion and gas centrifuge processes, developed in this country and Western Europe, require less electricity. All demand huge investments of capital and technology.

A major question is what controls West Germany will require on the technology. As a signer of the nonproliferation treaty, Bonn is under some restraints. But the treaty's restrictions on supplies of enriched uranium need not apply if Brazil produces the weapons-grade fuel itself.

Without naming countries, U.S. Arms Control and Disarmament Director Fred C. Ikle said in April, "Unhappily, short-sighted commercial interests sometimes militate against application of effective controls . . . You would think that all nations willing to export nuclear materials or equipment would be anxious to prevent proliferation.

"Even the largest nations would suffer greviously if nuclear explosives became widely available."

The president of Brazil's nuclear energy commission, Hervasio de Carvalho, told Washington Post special correspondent Bruce Handler that the country must act now to assure supplies for its booming seaboard cities.

Carvalho explained that most of the rivers with undeveloped hydroelectric potential are too far away for cheap transmission to the cities.

Enriched uranium, however, could be produced at jungle generating sites and brought to the eight or so nuclear power plants—with a total capacity of nearly 10 million kilowatt hours—foreseen in the agreement.

Carvalho pointed out that the "basic principles" for bomb-making "are known in practically all countries," but that there are still "technical secrets."

A main U.S. control on those secrets has been refusal to sell the technology for production of enriched uranium.

Secretary of State Henry A. Kissinger offered assurances last week at the International Energy Agency meeting in Paris that the United States would increase supplies of enriched uranium to meet demand in countries agreeing to safeguards against proliferation of arms.

But West Europeans, and now the Brazilians, have been unwilling to rely solely on U.S. sources.

Neither Brazil nor Argentina signed the nonproliferation treaty because, they said, it offered unfair advantages to the nuclear powers. Both are also exempt from the lesser-known 1967 treaty establishing Latin America as a nuclear-free zone.

Argentina has not ratified the treaty and Brazil did so with a waiver requiring all territories within the zone to adhere before it takes effect for Brazil.

A member of Brazil's Chamber of Deputies, Lysaneas Maciel, told the Associated Press Friday in Brasilia that he had been told by an Argentine legislator that the Agrentines are able to produce a nuclear explosion.

"That may cause a problem of imbalance in Latin America," said Maciel, who is chairman of the mines and energy committee of the Brazilian lower house.

Brazil, with a population of 100 million but a per capita income under $700, is a traditional competitor of Argentina, where the population of 24 million has a per capita income of about $1,000.

Argentina has long invested in nuclear research and has a nuclear power plant functioning, whereas Brazil's first station—provided by Westinghouse with U.S. enriched uranium—is still under construction.

The West-German-supplied plant now operating and a second Argentine plant being supplied by Canada both use natural rather than enriched uranium.

As India proved with the use of plutonium in its Canadian-provided plant, nuclear explosions are possible without enriched uranium.

But as U.S. officials see it, the Indian and now the Brazilian cases show that the real proliferation is of technology, not just fuel. Once the national capacity is built up, the national leaders can use it for peaceful explosions or nuclear bombs.

And while such decisions are tightly held, U.S. officials show intense concern that Brazil and Argentina have both decided to produce the bomb.

Mr. PASTORE. I must say at this juncture, parenthetically, that the substance contained in that article is correct.

The article points out that West Germany is about to enter into an agreement with the Brazilian Government to provide several large nuclear reactors, a fuel reprocessing plant, and a uranium enrichment plant. In other words, the arrangement would provide essentially an entire fuel cycle for the Brazilians. This matter disturbs me greatly as it does, I am sure, many of my colleagues and interested citizens. The Brazilian Government has not signed or ratified the Nonproliferation Treaty. In fact, the representatives of the Brazilian Government have made statements which have been carried in the press to the effect that they do not preclude the possibility of developing peaceful nuclear explosions. The scientific director of Brazil's center of physical research is quoted in the New York Times of August 24, 1974, as saying:

Brazil already has the necessary conditions for building its first atomic bomb.

I ask unanimous consent that that New York Times article be printed in the RECORD at this point.

There being no objection, the article was ordered to be printed in the Record, as follows:

[From the New York Times, Aug. 24, 1974]

BRAZILIAN A-BOMB REPORTED WITHIN COUNTRY'S CAPACITY

RIO DE JANIERO, Aug. 23.—The scientific director of Brazil's Center of Physical Research, Alfredo Marques, said yesterday that "Brazil already has the necessary conditions for building its first atomic bomb."

But Mr. Marques, speaking at an astronomy seminar, said there were other problems to be solved in making the bomb, because "a project of this nature involves rather ample questions, including the diplomatic field."

Brazil presently depends on the United States for plutonium and enriched uranium. The supplies are covered by an agreement signed with the United States Government two years ago, providing radioactive materials for Brazilian nuclear power plants for 30 years.

Mr. PASTORE. Mr. President, it is my understanding that behind the scenes the U.S. Government has taken steps to try to dissuade the Federal Republic of Germany from undertaking such an arrangement, particularly on providing enrichment and reprocessing capabilities to Brazil. Notwithstanding protestations by U.S. officials, including a meeting last April in Bonn, the arrangement apparently is going to be executed. I have been advised that on April 30 of this year the West German Parliament approved in principle the sale and the related arrangements to provide power reactors, a pilot plant for reprocessing fuel, and an enrichment capability to Brazil.

Now, I understand that the United States has sold Brazil two research reactors and a power reactor. The research reactors began operating in 1958 and 1960, respectively, and they do not have any significant amounts of plutonium connected with them because of their small size and design. The power reactor will not come into operation until 1976. All of these arrangements are governed by an Agreement for Cooperation between the United States and Brazil signed on July 17, 1972—which superseded an agreement signed in 1955—and this agreement runs until the year 2002. All of the facilities that I have mentioned are under International Atomic Energy Agency safeguards.

The proposed sale by West Germany to Brazil adds, however, a completely new dimension to the nonproliferation problem. West Germany is going to provide essentially a complete fuel cycle which could assist Brazil in making a nuclear bomb, if it so desires. Brazilian officials have been quite frank to indicate that Brazil does not plan to sign the Nonproliferation Treaty.

This, of course, reminds us all too vividly of the situation when India became the sixth nuclear power. The Indians utilized plutonium produced in a reactor not subject to IAEA safeguards and are now constructing a power reactor not under IAEA safeguards utilizing technology and knowhow obtained from a Canadian power reactor. I think this is an extremely important fact because no matter what arrangements are made with the West Germans, even if they were completely effective, there is nothing to preclude the Brazilians from building separate and indigenous reprocessing and enriching facilities simply by copying what the West Germans have given them, and then deciding to build a nuclear explosive device, unless all such reproduced facilities are specifically subject to adequate IAEA safeguards.

Arrangements such as the proposed one between West Germany and Brazil would greatly aggravate the additional measures which

must be taken to deal with nonproliferation of nuclear explosive devices. There are those, myself included, who strongly believe that the adequacy of international safeguards must be carefully and promptly reexamined and strengthened, and that this country should provide leadership to that end.

I am informed that the United States has urged its manufacturers of nuclear facilities not to enter into any arrangement such as the one proposed by West Germany, pending further study of the situation. and that the manufacturers have agreed. I applaud this decision because we cannot expect others to show restraint if we do not ourselves exercise restraint. The problem of nuclear explosive device proliferation does not concern any one country of the world or groups of countries—every nation's security and survival is directly involved. Secretary of State Kissinger in an address on September 23, 1974, before the 29th United Nations' General Assembly, said that the United States is prepared to join with other countries in the world community to work urgently toward a system of effective international safeguards against the diversion of plutonium to nuclear explosives. The Secretary said, among other things that—

> The United States will shortly offer specific proposals to strengthen safeguards to other principal supplier countries.

I hope that the Secretary is now acting decisively to present specific proposals, at the earliest date, to the principal countries which supply nuclear technology which could lead to the proliferation of nuclear explosive devices.

Despite all of this, and despite the protestations of our State Department, the West Germans have decided to go ahead because they apparently look upon this as "business as usual." Nothing could be further from responsible action, no matter who the supplier might be.

I strongly stress the need and importance for the United States to urge the Federal Republic of Germany not to proceed with the arrangement, until these matters, which are of the gravest international concern, receive the most deliberate and careful consideration at the highest levels of international diplomacy.

West Germany's apparent disregard of the plea of our Government on this important international policy issue is really difficult for me to understand and accept. The United States has gone out of its way to assure our NATO allies, and particularly the West Germans, that we would defend them and has backed up this commitment with positive actions. Yet despite this, and despite the obvious need for reason and sound judgment to prevail, the pleas of our Government have been to no avail.

And what concerns me to no end is the fact that this is a likely peril being instituted by an ally in our own back yard, so to speak, while, at the same time, the U.S. Government is heavily committed in West Germany's backyard to defend them against a likely peril.

I urge the Secretary of State and the President to use and exhaust every available diplomatic avenue to assure that the proposed arrangement—and any similar arrangement which may be proposed by any other nation—be held in abeyance until the principal supplier countries have had a reasonable opportunity to consider and agree on the practical steps which can and must urgently be taken toward a system of effective international safeguards against the proliferation of nuclear explosives.

Appendix A–9

Statement by Representative George E. Brown Jr., in the U.S. House of Representatives Concerning: "Nuclear Proliferation": June 18, 1976

[Excerpted from the Congressional Record, June 18, 1976, page E 3468.]

Mr. Speaker, when you honored me with an appointment to the Joint Committee on Atomic Energy a short time ago, I endeavored to update my files and improve my understanding of the many complex issues within the jurisdiction of the Joint Committee. This is a continuous, on-going process, especially since the nuclear field has undergone dramatic changes in public perception, and achieved a new level of importance on a global scale.

Among the areas undergoing change is the policy and practice of control of proliferation of nuclear weapons. This subject has received extensive attention since the explosion of the first bombs over Japan in World War II, with specific proposals for control being made primarily in 1946 at the meeting of the United Nations Atomic Energy Commission, and during the negotiations and final agreement on the Non-Proliferation Treaty.

In spite of these past efforts, nuclear proliferation is occurring and, if the popular press is to be believed, beyond the control of the United States. Not all Members of Congress agree with this widespread assumption, and efforts are again being made to control the spread of nuclear weapons.

The Senate Government Operations Committee has passed a bill, S. 1439, the "Export Reorganization Act of 1976," which hopes to reduce proliferation by reorganizing certain export functions of the Federal Government. The House has passed House Concurrent Resolution 570 which also addressed the nuclear proliferation issue. In addition, Mr. Long of Maryland has another resolution, House Resolution 951, which calls for the establishment of a House select committee to explore the nuclear export policy of the United States and the worldwide nuclear proliferation issue. This resolution, it should be noted, has over 120 cosponsors.

The Joint Committee on Atomic Energy has scheduled hearings on June 22 and June 29 on the bill. S. 1439, where it is expected that many of these issues will be discussed.

For background on these issues, I recently addressed two questions to the Congressional Research Service. The first question was, "What controls could the United States exercise over nuclear proliferation?" The second question was closely related, since it dealt with one suggested option for controlling proliferation. That question was, "Is leasing of reactor fuel a viable option to control proliferation?"

In order to share these answers with my colleagues, I will insert them in the RECORD at the conclusion of these remarks. One point should be highlighted, however, since it relates to a bill, H.R. 8401, the Nuclear Fuel Assurance Act of 1976, which is now on the House calendar. That point is that if the private enrichment plants, which are partially authorized in H.R. 8401, are built, the leasing option will be much more difficult to negotiate. The other point, also related to H.R. 8401, which should be made is that if the United States expects to convince other nations not to build reprocessing facilities, the United States will have to expand its own enrichment capacity.

I offer the CRS materials for my colleagues review.

The material follows:

THE LIBRARY OF CONGRESS,
CONGRESSIONAL RESEARCH SERVICE,

Washington, D.C., June 16, 1976

To: The Honorable George Brown. Attention: T. Lynch.
From: Warren H. Donnelly, Senior Specialist, Energy Environment and Natural Resources Policy Division
Subject: Control of Proliferation of Nuclear Weapons.

Question 1. What controls could the United States exercise over nuclear proliferation?

In replying to this question, I have sought to identify conceivable measures which the United States could consider to control further proliferation of the ability to make nuclear weapons among nations that now do not have them. Some measures would require international actions, others could be unilateral by the United States. The options listed vary greatly in probable acceptability because some of them would require substantial changes in the relations between nations individually, and between the developed nations and those seeking to develop into industrial states. I have not excluded such options, however, because acceptability depends so much upon the urgency which the reader assigns to control of proliferation and the relative priority he would assign to it in comparison with other national and international problems. If, as some analysts and statemen indicate, control of proliferation is truly the gravest long-term threat we face—graver than famine or energy shortages, for example—then certain measures would be acceptable simply because of the press of events and fears of nuclear holocaust. If, however, control of proliferation is viewed as but one of many urgent problems, then the range of acceptable measures would be narrowed and individual measures subject to compromise in the give and take. The purpose of the following listing is to indicate the range of potential international actions the United States could promote and the range of unilateral actions it could take to control proliferation.

Briefly, the conceivable measures to control further proliferation include:

1. Removing nuclear material from world use.
2. Reducing pressures to proliferate.
3. Keeping nuclear explosive materials and technology out of the hands of non-weapons nations and subnational groups.
4. Making theft, diversion or sabotage more difficult.
5. Increasing the probability of detection of theft or diversion of nuclear materials.
6. Applying sanctions or other measures against nations which undertake or persist in those nuclear activities which are particularly dangerous to world peace and to the security of the United States.

Each category includes subordinate measures that the United States could undertake in cooperation with other nations, or unilaterally.

I. Remove nuclear materials from world use.

The most drastic control of nuclear proliferation, if it could be accomplished, would be to remove all nuclear materials from the possession and use by persons, organizations and nations. To do so would require the collection of all nuclear materials, from all weapons and all nuclear power plants and related facilities; the dispersion of that material back into nature in some unrecoverable form; the sealing of all uranium and thorium mines and absolute prohibitions of their further use; the erasure from world literature of all information about nuclear energy; the deletion from all teaching and instruction of any information about nuclear

energy; and the isolation from society for the remainder of their livs of all persons with knowledge and experience in the use of nuclear energy for military and civil purposes.[1]

A lesser unilateral measure for U.S. action would be to declare a national moratorium on use of nuclear energy, shut down all nuclear establishments, and destroy all nuclear weapons as an example to the world. A more limited option would be a national moratorium on civil use of nuclear energy in the hope of convincing other nations to do likewise. Note, however, that abolishing civil use of nuclear energy throughout the world woud substantially reduce, but not stop proliferation because civil nuclear power is not necessary for the production of nuclear explosive materials.

II. Reduce pressures to proliferate.

1. International measures—

a. Convince non-weapons nations that they do not need nuclear weapons for their security and well-being.

b. Begin to substantially reduce present levels of nuclear armaments of the United States and the Soviet Union, as each nation is committed to do under the Non-Proliferation Treaty, thereby demonstrating that the superpowers do not regard nuclear weapons as necessary.

c. Conclude an effective, comprehensive nuclear test ban treaty that also bars testing of peaceful nuclear explosives.

d. Establish additional regional nuclear free zones such as provided by the Antarctic Treaty of 1959 and for Latin America by the Treaty of Tlatelolco in 1967.

e. Provide reliable international assurances to nations that clandestine production of nuclear explosive materials and devices by neighbors or competitors will be detected.

f. Persuade more nations to ratify the NPT and so to forswear use of nuclear weapons. Provide incentives and special treatment for nations that ratify.

g. Persuade nuclear weapons nations to pledge no first use of nuclear weapons against non-weapons states.

h. Improve ways for nations to settle disputes without resort to threatened or actual use of nuclear weapons.

2. Unilateral measures—

a. United States reduction of its nuclear arms stockpile and use of recovered nuclear explosive materials for nuclear fuel.

b. United States pledge of no first use of nuclear weapons against a non-weapons state, or against any state.

III. Keep nuclear explosive materials and technology out of the hands of non-nuclear weapons nations.

A. Reduce the need for nuclear power by non-weapons countries:

1. International measures—

a. Provide reliable, economically competitive supplies of oil, coal, and synthetic fuels to developing nations so they would not need nuclear power.

b. Provide technical and financial assistance to develop indigenous fuel and energy resources, perhaps via the International Atomic Energy Agency.

c. Exchange oil, coal and synthetic fuels for uranium from developing countries on an energy equivalence basis.

2. Unilateral measures—

a. Expedite U.S. development of energy supply technologies suitable for developing countries and creation of industries to make, export, install and help service such technologies. Primary candidates would include solar energy, improved water turbines, wind machines, etc.

b. Provide attractive U.S. financial assistance for use of such alternatives instead of nuclear power.

c. Provide U.S. training for technical personnel of such countries in these technologies.

B. Reduce the need of non-weapons nations to produce and possess weapons-grade nuclear materials.

1. International measures—

a. Encourage nuclear interdependence among nations, particularly between nuclear supplier nations and other nations, so that national nuclear independence is not considered to be necessary for the economic health and future of nations using nuclear energy.

[1] Even if all these things were done, the folklore and culture would still include enough information so that future scientists could rediscover uranium, fission and nuclear explosives.

b. Establish international ownership and operation of all nuclear energy facilities throughout the world. (A revival and updating of the Baruch plan of 1946.)

c. Establish multinational, regional centers under IAEA safeguards for production of enriched uranium, reprocessing of used nuclear fuels, storage of fissionable materials, fabrication of fissionable materials into nuclear fuel elements, temporary storage of used nuclear fuels, and permanent management of radioactive wastes from reprocessing operations.

d. Persuade present nuclear supplier states to guarantee a supply of enriched uranium to other nations not interruptible for political or foreign policy reasons.

e. Establish regional nuclear fuel repositories under IAEA control and safeguards which could store perhaps a year's working inventory of nuclear fuel per country so as to insulate them from interruption of access to enriched uranium.

f. Persuade nuclear supplier states to limit export of nuclear fuels to natural uranium and to low enriched uranium. (Use of highly enriched uranium and plutonium would be permissible only within nuclear supplier states.)

g. Persuade nuclear supplier nations not to sell but rather to lease nuclear fuels and to require return of used fuels to the supplier state or to a multinational fuel reprocessing center.

h. Persuade nuclear supplier states to offer a credit for plutonium estimated to be contained in returned used nuclear fuels, the credit to be in cash, or in an enriched uranium of equivalent energy content.

2. Unilateral measures—

a. Guarantee future supply of U.S. enriched uranium to those nations that agree not to reprocess nuclear fuels or to build and operate any reprocessing facility.[2]

b. Offer to lease U.S. enriched uranium at prices attractive enough for user nations to accept U.S. conditions and controls.

c. Ban the export of U.S. enriched uranium to any nation, other than present nuclear supplier nations, that reprocess used nuclear fuels.

C. Slow the spread of the ability to make nuclear materials and weapons:

1. International measures—

a. Persuade nuclear supplier nations not to export technology, plant and equipment, or to provide technical assistance, training, or financial assistance for the construction and operation of facilities to enrich uranium or to produce plutonium.

b. Persuade non-supplier nations to accept an annual IAEA survey of indigenous nuclear industries to assess their capability to produce nuclear explosive materials or weapons.

c. Offer nuclear supplier nations the benefits of a market-sharing arrangement for nuclear power exports in return for measure (a) above.

d. Emphasize the NPT commitment not to assist "in any way" a non-nuclear state to make nuclear explosive devices.

e. Persuade ratifiers of the NPT to agree to removal of the obligation in Article V to make available the benefits of peaceful nuclear explosions to non-nuclear weapons nations, and provide non-nuclear ways of obtaining the expected benefits of these devices,

2. Unilateral measures—

a. Ban the U.S. export of technology, materials, plant and equipment for construction and operation of facilities to produce enriched uranium or plutonium except to multinational fuel centers.

b. Ban all U.S. nuclear exports to nations which will not:

(1) Ratify the NPT or submit all of their nuclear activities to IAEA safeguards.

(2) Agree to abstain from building and operating any enrichment or reprocessing facility except, for the present nuclear nations.

c. Ban Export-Import Bank assistance for nuclear power to nations that will not comply with (b) above.

d. Ban all forms of U.S. economic, military and other assistance to those nuclear supplier nations that, through exports and other assistance, help other nations to build and operate national fuel enrichment or reprocessing plants.

e. Limit training of foreign nationals in the United States in nuclear technology to nationals of those nations which agree to U.S. policy on nuclear export control.

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[2] NOTE. This measure would require prompt expansion of the U.S. domestic enrichment capacity.

D. Keep nuclear explosive materials out of the hands of developing countries.

1. International measures—

a. Ban the export of highly enriched uranium or plutonium except that incorporated in fabricated nuclear fuel.

b. Ban the export of nuclear power reactors that require highly enriched uranium for fuel.

2. Unilateral measures—

a. Ban U.S. export of enriched uranium or plutonium not incorporated in fabricated nuclear fuel.

b. Ban U.S. export of nuclear power reactors that require highly enriched uranium for fuel.

IV. Make theft, diversion or sabotage more difficult.

1. International measures—

a. Convene an international convention to reach and ratify international agreement to authorize, fund and direct the International Atomic Energy Agency to establish standards for the physical protection of nuclear materials and installations for civil purposes and for the transportation of nuclear materials; and to authorize the Agency to regularly inspect for compliance with such standards and to publish the results of its inspections.

b. Establish an international nuclear security force to protect international shipments of nuclear materials including high-level wastes.

c. (1) Arrange for international collection analysis and use of intelligence information to anticipate attempted theft or diversion of nuclear materials, clandestine production of nuclear materials and weapons, and sabotage of nuclear installations; (2) intercept and prevent such attempts; (3) capture and hold persons involved in such attempts; (4) recover stolen materials.

d. Establish theft, diversion of nuclear material and its subsequent misuse, and sabotage of nuclear facilities and shipments as serious international crimes to be tried in world court.

e. Consolidate the several different IAEA safeguards systems into one single, coherent system with emphasis upon personal inspection.

2. Unilateral measures—

a. Require analysis and assessment of physical security systems available to protect U.S. exports, and upgrade physical security as may be necessary to meet U.S. requirements, as a prerequisite for an export license. Perhaps require compliance with U.S. standards of IAEA standards for all nuclear materials and facilities rather than solely those received from the United States.

b. Require recipient nations to agree to subsequent U.S. physical security inspections and to correct deficiencies found.

V. Increase the probability of detection of theft or diversion of nuclear materials.

1. International measures—

a. Persuade nuclear supplier nations to require all non-weapons recipient nations to place all of their nuclear activities under IAEA safeguards as a condition of export and all other assistance in use of nuclear energy.

b. Strengthen IAEA safeguards by:

(1) Combining the several present IAEA safeguards systems into one unified, coherent system, which emphasizes personal inspection.[3]

(2) Beginning a planned expansion of IAEA inspection and safeguards capability (system, personnel, plant and equipment) to be ready for the anticipated substantial expansion in nuclear energy in the early 1980s.

(3) Improving systems, technologies, instrumentation and equipment for national and international safeguards systems.

(4) Increasing public credibility of IAEA safeguards by reducing the secrecy on details of IAEA agreements for application of safeguards and results of IAEA inspections.

(5) Providing a reliable, independent source of financing IAEA safeguards, perhaps by an international tax on generation of nuclear energy, or inspection fees.

(6) Establishing an international institute for safeguards research and for training of safeguards personnel of all nations.

2. Unilateral measures—

a. Increase U.S. contributions to IAEA safeguards activities to both increase and improve the inspection force and to better equip it with field and laboratory instruments and equipment.

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[3] At present the IAEA safeguards system for NPT nations differs from that for non-NPT nations. The former emphasizes use of systems and special equipment with limited inspection rights. The latter emphasizes unrestricted access of inspectors to nuclear facilities.

b. Expedite completion of the long-delayed agreement between the United States and the IAEA to voluntarily place selected U.S. nuclear facilities under IAEA safeguards. Make available information about details of the agreement and subsequent inspections that normally are held secret for IAEA safeguards agreements with other countries.

c. Help to recruit well qualified personnel for all IAEA posts.

d. Establish a continuing training program in ERDA facilities for IAEA safeguards personnel and their counterparts from national safeguards programs.

VI. Apply sanctions or other measures to those nations which persist in nuclear activities that are particularly dangerous to world peace and to the security of the United States.

1. International measures—

a. By international convention and treaty, or by super-power agreement, provide for sanctions and other measures to be taken against any present non-weapons nation that:

(1) Constructs and operates enrichment or plutonium production facilities.

(2) Develops and tests nuclear explosives of any sort.

(3) Violates NPT commitments or IAEA safeguards agreements.

(4) Provides haven for nuclear saboteurs or criminals.

b. Persuade nuclear supplier nations to apply sanctions and take other measures against such nations, and against any supplier nation which helps a non-weapons state to acquire the ability to produce weapons-grade nuclear materials.

2. Unilateral measures—

a. Cut off present and future U.S. nuclear assistance of any kind to developing nations that undertake to produce highly enriched uranium or plutonium.

b. Cut off all forms of nuclear and economic assistance to supplier nations that help developing nations to produce plutonium or highly enriched uranium.

c. Cut off all forms of nuclear and economic aid to those non-weapons nations which will not either ratify the NPT or agree to IAEA inspections of all their nuclear activities.

d. Declare that persistence in certain dangerous nuclear activities will be regarded by the United States as hostile to its security and interests.

Question 2. Is leasing of reactor fuel a viable option to control proliferation?

SUMMARY

The leasing of reactor fuel by nuclear supplier nations or by an international or perhaps multinational, regional organization could be one effective way to help to control proliferation by eliminating reasons for nonsupplier nations to reprocess plutonium and re-use it as a fuel. By helping to keep plutonium out of the hands of non-supplier nations, leasing would substantially reduce the possibility that plutonium would be stolen or diverted in such nations to make nuclear weapons or other terrorist devices. National or international leasing of nuclear fuel, however, might have some disadvantages to be considered.

DISCUSSION

The problem

The proposal addresses a central dilemma of proliferation control, which is: If developing nations are supplied with the means to exploit nuclear energy, how can those nations which supply the technology, fuels and hardware hope to retard the proliferation of nuclear explosives and still provide the means of increasing the standard of living of these nations through nuclear energy?

An underlying proposition which leads to this dilemma is that developing nations of the world will have to use uranium to reduce their dependence on imported oil.

The proposal

Leasing of nuclear fuels has been proposed to limit or slow proliferation by keeping plutonium out of the hands of developing countries. This follows from the observation that proliferation is not as much affected by the presence of nuclear powerplants, as by the presence of used nuclear fuels from which the countries could recover the nuclear explosive plutonium and so be able to make nuclear weapons.

The proposal would substantially close this route to proliferation by having nuclear supplier nations[4] or an international (worldwide) or multinational (regional) organization lease nuclear fuel to using nations. After the fuel has produced its designed amount of energy, it would be returned to the supplier which would own the contained plutonium and would decide what to do with it. The lease fee would depend upon the energy content of the fuel.

Such a leasing system would mean that non-nuclear weapons states would have no economic reason to build and operate fuel reprocessing plants, and the building such a plant would then be a suspicious act, a signal of the start of a weapons effort which could be countered by diplomatic and other measures.

Advantages of the proposal

(1) Nations other than the few supplier nations have no economic reason to reprocess, recovered plutonium.

(2) User nations would not have to store used fuels or intensely radioactive wastes from fuel reprocessing.

(3) User nations would have no reason to build and operate uranium enrichment plants which might be used to produce weapons-grade uranium.

Matters for consideration

(1) A proposal for leasing would have to consider the relation between the nuclear supplier nations and those non-supplier nations that are sources of natural uranium.

(2) Leasing could imply that only nuclear supplier nations could own uranium and could control its production and use. If so, it would not address production of uranium by those developing nations which have uranium resources and subsequent use of that nuclear fuel in power reactors designed for natural uranium fuel.[5]

(3) Criteria for setting lease charges would have to be established. For example, would the supplier nations set a common price analagous to OPEC oil pricing or would charges be competitive? Also, to what extent, if any, would leasing nations expect to make a profit, or, on the other hand, to subsidize the rates to provide a financial incentive?

(4) For a leasing system to be acceptable to user-nations, supplier nations must provide credible assurance of reliable supply. This implies that supplier nations would have to convince user nations that they would not threaten to withhold or interrupt supplies of nuclear fuel for political or foreign policy reasons. For example, the United States would have to forgo using the threat to cut off nuclear fuel supply as a way to influence policies of other nations. This problem, however, would diminish as the number of supplier nations increased.

(5) Private ownership of fissionable materials in the United States poses the question: Could the United States advocate leasing of nuclear fuel to user nations while permitting private ownership and reprocessing of nuclear fuels by the U.S. nuclear power industry?

(6) Leasing procedures would have to be established. Would the leasing approach be accomplished through formal international agreement or treaty, or by informal understanding?

(7) The proposal suggests possible requirement of some form of international or external control of prospecting, mining and milling for uranium in non-supplier states.

(8) The proposal implies that nuclear supplier nations could recover and use plutonium as a domestic nuclear fuel, presumably saving normal or slightly enriched uranium for exports. If this is contemplated, however, the proposal lands squarely in the midst of the current controversy over risks from plutonium as a nuclear fuel. Also, would leasing contemplate the export of plutonium mixed with uranium (mixed oxide) in fabricated nuclear fuel elements to user nations?

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[4] The principal nuclear supplier nations for enriched uranium are the United States and the Soviet Union. Within a few years a multinational enrichment plant in France is scheduled to supply enriched uranium, and beyond that are prospects that the United Kingdom, West Germany and Holland within a few years may prove the economic and technical feasibility of an alternative enrichment process, the centrifuge process.

Major suppliers of complete nuclear power reactors include the United States, the Soviet Union, the United Kingdom, Canada, France and West Germany. Japan will probably be a major supplier within a few years.

[5] Canada has developed a power reactor that uses natural uranium for fuel, the CANDU reactor. Argentina and India have such reactors under construction or in use and Canada plans to export the designs and technology for building such reactors.

(9) Would lease charges be negotiated individually with user nations, or would an across-the-board leasing schedule be adopted by the suppliers, acting as a monopoly or cartel?

A background note

The idea of limiting nuclear proliferation by controlling ownership of fissionable materials is not new. Indeed, it was the keystone of the U.S. proposals put forward by Bernard Baruch to the United Nations Atomic Energy Commission in 1946, which called for international ownership and control of nuclear facilities and materials. When that proposal failed, Congress, in the Atomic Energy Act of 1946, applied the concept to the domestic use of atomic energy. Under the original atomic energy act, the Government owned all nuclear materials and leased them to users. In retrospect, this was an extraordinary legislative act because it intervened directly in the operations of the free enterprise, private property concepts if the United States' economy. Government ownership was continued to the major overhaul of the atomic energy legislation in 1954 and it was not until the Private Ownership Amendments of 1964 that Congress permitted special nuclear materials to be owned by private parties within the United States.[6]

[6] Pub. L. 88-489, 78 Stat. 602, Aug. 22, 1964.

APPENDIX B

Nuclear Export and Control

Appendix B–1

Presidential Documents

TITLE 3—THE PRESIDENT

Executive Order 11902, February 2, 1976

Procedures for an Export Licensing Policy as to Nuclear Materials and Equipment

The Energy Reorganization Act of 1974 transferred to the United States Nuclear Regulatory Commission the licensing and related regulatory functions previously exercised by the Atomic Energy Commission under the Atomic Energy Act of 1954, as amended.

The exercise of discretion and control over nuclear exports within the limits of law concerns the authority and responsibility of the President with respect to the conduct of foreign policy and the ensuring of the common defense and security.

It is essential that the Executive branch inform the Nuclear Regulatory Commission of its views before the Commission issues or denies a license, or grants an exemption.

Now, therefore, by virtue of the authority vested in me by the Constitution and statutes of the United States of America, including the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 *et seq.*), and as President of the United States of America, it is hereby ordered as follows:

Section 1. (a) The Secretary of State is designated to receive from the Nuclear Regulatory Commission a copy of each export license application, each proposal by the Nuclear Regulatory Commission to issue a general license for export, and each proposal by the Nuclear Regulatory Commission for exemption from the requirement for a license, which may involve a determination, pursuant to the Atomic Energy Act of 1954, as amended, that the issuance of the license or exemption from the requirement for a license will, or will not, be inimical to or constitute an unreasonable risk to the common defense and security.

(b) The Secretary of State shall ensure that a copy of each such application, proposed general license, or proposed exemption is received by the Secretary of Defense, the Secretary of Commerce, the Administrator of the United States Energy Research and Development Administration, hereinafter referred to as the Administrator, the Director of the Arms Control and Disarmament Agency, hereinafter referred to as the Director, and the head of any other department or agency which may have an interest therein, in order to afford them the opportunity to express their views, if any, on whether the license should be issued or the exemption granted.

SEC. 2. Within thirty days of receipt of a copy of a license application, proposed general license, or proposed exemption, the Secretary of Defense, the Secretary of Commerce, the Administrator, the Director, and the head of any other agency or department to which such copy has been transmitted, shall each transmit to the Secretary of State his views, if any, on whether and under what conditions the license should be issued or the exemption granted.

SEC. 3. The Secretary of State shall, after the provisions of section 2 of this order have been complied with, transmit to the Secretary of Defense, the Secretary of Commerce, the Administrator, the Director, and the head of any other department or agency who has expressed his views thereon, a proposed position of the Executive branch as to whether the license should be issued or the exemption granted, including a proposed judgment as to whether issuance of the license or granting of the exemption will, or will not, be inimical to or constitute an unreasonable risk to the common defense and security.

SEC. 4. If the heads of departments and agencies specified in section 2 of this order are unable to agree upon a position for the Executive branch, the Secretary of State shall refer the matter to the Chairman of the Under Secretaries Committee of the National Security Council in order to obtain a decision. In the event the Under Secretaries Committee is unable to reach a decision, the Chairman of that Committee shall refer the matter to the President for his decision.

SEC. 5. The Secretary of State, after taking the actions required by this order, shall notify the Nuclear Regulatory Commission of the position of the Executive branch as to whether the license should be issued or the exemption granted, including the judgment of the Executive branch as to whether issuance of the license or granting of the exemption will, or will not, be inimical to or constitute an unreasonable risk to the common defense and security. The Executive branch position shall be supported by relevant information and documentation as appropriate to the proceedings before the Nuclear Regulatory Commission.

GERALD R. FORD.

THE WHITE HOUSE,
February 2, 1976.

[FR Doc. 76-3382 Filed 2-2-76;11:23 am]

Appendix B–2

Export Licensing Procedures Nuclear Regulatory Commission: April 1976

When NRC receives an export license application, it will be distributed to relevant NRC staff and, at the same time, forwarded to the State Department, which will be asked for a presentation embodying the data NRC requires as well as the formal views of the Executive Branch on the given license request.

Under Executive Order 11902, dated February 2, 1976, entitled "Procedures for an Export Licensing Policy as to Nuclear Materials and Equipment" (F.R. Vol. 41, No. 23, Page 4877), the Department of State is designated as the agency to receive copies of export license applications, proposed general licenses and proposed exemptions from the requirement for a license, from the Nuclear Regulatory Commission and to ensure that a copy of each such application is received by the Secretary of Defense, the Secretary of Commerce, the Administrator of the U.S. Energy Research and Development Administration, the Director of the Arms Control and Disarmament Agency, and the head of any other department or agency which may have an interest therein, in order to afford them the opportunity to express their views, if any, on whether the license should be issued or the exemption granted.

For the purpose of assuring that the export will be used exclusively for peaceful purposes and will meet the "common defense and security" requirement of the Atomic Energy Act, the following information inter alia will be developed and assessed by the relevant agencies:

1. What is the purpose for the export?
2. Does the recipient country have an Agreement for Cooperation with the United States under Section 123 of the Atomic Energy Act, as amended? And, if so, is the export in question covered by the Agreement?
3. Has the recipient country accepted and implemented IAEA safeguards and/or other appropriate supplementary bilateral conditions (including, where applicable, understandings regarding reexport) imposed by the United States?
4. In cases in which the recipient country is not required by the NPT to accept IAEA safeguards, does the recipient country or organization have accounting and inspection procedures such as to assure compliance with the requirements of the relevant U.S. Agreement?
5. Does the recipient country have adequate physical security arrangements to deal with threats of sub-national diversion of significant quantities of nuclear weapon materials (plutonium or highly enriched uranium)?
6. What is the position of the recipient country with regard to nonproliferation (e.g., party to NPT, LANFZ, public statements)?

7. What understandings does the United States have with the recipient country with respect to the use of U.S.-supplied material or equipment to acquire or develop nuclear explosive devices for any purpose, and as to the recipient country's policies and actions as to such development using equipment and material from any source?

8. What other factors are there which bear on the issuance of the export license, such as further U.S. understandings with the recipient country, other supplier countries or interested regional countries?

While the NRC will not directly participate in the Executive agencies' development and evaluation of this information, NRC will be in regular staff level communication with the Executive Branch so that particular concerns of the Commission can be taken into account in the Executive Branch review.

The Executive Branch will then forward to the NRC an analysis of the pertinent and required information, as well as a coordinated Executive Branch view on the license application. The Executive Branch has advised us that if the involved Executive agencies should be unable to resolve any differences in view during the development of the analysis, these differences will then be resolved through the mechanism of the National Security Council and ultimately by the President himself, if necessary. The NRC will be made aware of this process by the Executive Branch.

The Commission will consider the Executive Branch presentation prior to making the NRC determination on the license. In reaching its decision, the Commission will also take into account all other matters of record in the licensing proceeding, including contributions to the record of its own staff, the applicant and such others who may be parties to the proceeding.

Within the NRC, issuance of the following licenses will be approved in advance by the Commission itself:

Any license involving more than one effective kilogram of special nuclear material, as defined in 10 CFR Part 70;

Any license involving 10,000 kilograms or more of source material;

Any license for a production or utilization facility or major component thereof;

Any other license having policy implications.

Routine applications not covered by the above criteria will be acted on, within NRC, by the NRC staff.

Appendix B–3

Nuclear Power Supply Capabilities of Various Countries: March 1, 1976

Country	NSSS vendors [1]	Other major reactor component vendors	Uranium ore processing	U_3O_8–UF_6 conversion	Fuel fabrication	Spent fuel reprocessing	Enrichment facilities
Argentina			X				
Australia			X				
Belgium [2]	X	X	X		X	X	
Canada	X	X	X	X	X		
France [2]	X	X	X	X	X	X	X
Federal Republic of Germany [2]	X	X	X	X	X	X	X
India	X	X	X	X	X	X	
Italy [2]	X	X		X	X	X	
Japan	X	X		X	X	X	
Netherlands [2]		X			X		X [3]
Portugal [2]			X				
South Africa			X				
Spain		X	X			X	
Sweden							
Switzerland							
U.S.S.R	X	X	X [4]	X [4]	X	X [4]	X
United Kingdom	X	X		X	X	X	X [3]
United States	X	X	X	X	X	X [5]	X

[1] Nuclear steam supply system (independent capability—Canada, France, Germany, Japan, Sweden, and others through a license or by subcontracting).
[2] Member of Euratom.
[3] Site of centrifuge enrichment facilities of tripartite group—Netherlands, United Kingdom, West Germany.
[4] Not known to have been offered internationally but the capabilities are believed to exist.
[5] U.S. reprocessing facilities presently have no contracts for reprocessing foreign spent reactor fuel and no spare capacity for further contracting.

Appendix B–4

Estimated Cumulative Value of Enriching Services and Reactor Sales to Exporting Country Through December, 1975

Exporting country	Enriching services (billions)	Power reactor sales: Number of reactors	Power reactor sales: Amount (billions)[1]	Remarks on financing
United States	Over $19.2[2]	[3] 48	$9.8	Eximbank with flexible down payment and interest rates below commercial interest rates.
U.S.S.R.	About $1.65[4]	[5] 5	.3	Barters on some sales.
Urenco (Netherlands, United Kingdom, and Federal Republic of Germany).	$2.16[2]			International credit, joint ownership.
United Kingdom—Capenhurst	$0.26	2	.1	
France—Eurodif	$11.43	9	2.2	BFCE credit agency, with up to 100 percent financing with flexible interest.
France—Pierrelatte	$0.86			
Federal Republic of Germany	See Urenco	7	1.8	KEW credit agency, with up to 75 percent financing, generally higher than prime rate.
Canada		5	.5	EDC credit agency, with up to 60 percent on some reactors.
Sweden		2	.4	

[1] Based on assumption that $300/KWe accrues to exporting country.
[2] Based on 1975 price levels.
[3] Does not include U.S. share of sales by licenses of U.S. companies or by joint ventures.
[4] Based on estimated price of $45/SWU, excluding fuel for reactors in bloc countries.
[5] Excludes 17 reactors exported to bloc countries—$2 billion.

Appendix B–5

INTERNATIONAL SAFEGUARDS OF NUCLEAR MATERIALS

[Excerpt from the Congressional Record, December 12, 1975. Page S 21961.]

The resolution (S. Res. 221) urging the President of the United States to take the leadership in seeking international cooperation in strengthening safeguards of nuclear materials, was considered and agreed to.

The preamble was agreed to.

The resolution, with its preamble, reads as follows:

Resolved, That the President seek the immediate international consideration of strengthening the effectiveness of the International Atomic Energy Agency's safeguards on peaceful nuclear activities and seek intensified cooperation with other nuclear suppliers to insure that most stringent safeguard conditions are applied to the transfer of nuclear equipment and technology to prevent the proliferation of nuclear explosive capability.

Whereas the Senate of the United States ratified the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in recognition of the devastation associated with a nuclear war and of the need to make every effort to avert the danger of such a war;

Whereas the parties to the treaty expressed a common belief that the proliferation of nuclear weapons would seriously increase the danger of nuclear war;

Whereas the United States and other parties to the treaty pledged to accept specified safeguards regarding the transfer to nonnuclear-weapon states of special nuclear materials and facilities for the processing, use, or production of such materials;

Whereas recent events, including the explosion of nuclear events, including the explosion of nuclear devices, the development of uranium enrichment facilities, and the proposed transfer of nuclear enrichment and reprocessing facilities to nonnuclear-weapon states, emphasize the imperative need to increase the scope, comprehensiveness, and effectiveness of international safeguards on peaceful nuclear activities so that there will be no further proliferation of nuclear weapons capability;

Whereas the Senate of the United States is particularly concerned about the consequences of transactions without effective safeguards that could lead to the production of plutonium and other special nuclear materials by nonnuclear-weapon states throughout the world; and

Whereas the Senate is particularly concerned about the proliferation threat posed by the possibility of the development in the near future of a large number of independent national enrichment and reprocessing facilities and therefore believes that the United States should take

the lead in securing agreement for the development of regional multinational, rather than national, centers to undertake enrichment and reprocessing activities in order to minimize the spread of technology which could be used to develop nuclear explosives: Now, therefore, be it

Resolved, That the Senate of the United States strongly requests and urges the President to seek through the highest level of consultation in the United Nations and with the other leaders of the world community, an intensive cooperative international effort to strengthen and improve both the scope, comprehensiveness, and effectiveness of the international safeguards on peaceful nuclear activities so that there will be a substantial and immediate reduction in the risk of diversion or theft of plutonium and other special nuclear materials to military or other uses that would jeopardize world peace and security; be it further

Resolved, That the President seek, through consultation with suppliers of nuclear equipment and technology, their restraint in the transfer of nuclear technology and their cooperation in assuring that such equipment and technology only is transferred to other nations under the most rigorous, prudent, and safeguarded conditions designed to assure that the technology itself is not employed for the production of nuclear explosives; and be it further

Resolved, That the Secretary of the Senate is directed to transmit copies of this resolution to the President of the United States and to the Secretary of State.

Appendix B–6

Statement by Senator Stuart Symington, in the U.S. Senate Concerning "Nuclear Suppliers Illlusion": November 4, 1975

[From the Congressional Record, Nov. 4, 1975, p. S19159]

Mr. Symington. Mr. President, France's sale of nuclear reprocessing equipment to South Korea—the subject of a recent editorial in the New York Times—is just one more example of how national commercial interests continue to override any consideration of nuclear weapons control.

Note that France is one of the nuclear supplier nations meeting in London in semisecrecy, supposedly to come up with a plan to control nuclear weapons spread.

Note also that West Germany—which recently sold a complete nuclear weapons fuel cycle to Brazil—is also a participant in this suppliers conference.

From the actions of these nations it would appear there is a lack of progress at that meeting though the illusion of progress is being maintained by public spokesmen.

One can only wonder whether the desire to control nuclear weapons spread really exists among certain supplier nations.

I ask unanimous consent that this editorial, "French Nuclear Spread," be reprinted in the Record.

There being no objection, the editorial was ordered to be printed in the Record as follows:

[From the New York Times, Oct. 29, 1975]

French Nuclear Spread

By deciding to sell South Korea equipment and technology to produce weapons-grade plutonium, the explosive material for atomic bombs, France has taken mankind a long step toward worldwide spread of nuclear weapons—and ultimate disaster.

For thirty years, the United States and other advanced nuclear countries have refused to sell such equipment. Then West Germany broke ranks in June by agreeing to sell Brazil a similar pilot reprocessing plant.

Apart from the threat to non-proliferation policy—and violation of the spirit of of the Nuclear Non-Proliferation Treaty, which both West Germany and France have pledged to honor—the Korean deal poses special dangers.

Divided Korea is the tinder box of Asia, with massive armies of the Communist North and the American-backed South facing each other across the 38th Parallel. North Korean ambitions to reunify the country by force, as was attempted in the 1950–53 war, have been reawakened by American withdrawal from Indochina. The South Korean nuclear move could provide a pretext for a Northern attack—or lead to the even more dangerous nuclear arming of North Korea, stimulating dormant pressure for nuclear weapons in Japan.

The prolonged efforts of American officials to discourage France and West Germany from their nuclear deals undoubtedly would have had a far better chance of success if Secretary Kissinger and President Ford had not over-pessimistically refused to engage their own personal prestige, and the full influence of the United States, for fear of a profitless crisis with major allies.

After an overly cautious approach to the issue, Secretary of State Kissinger has belatedly underscored the awesome risks involved, when he told the United Nations General Assembly last month: "The greatest single danger of unrestrained nuclear proliferation resides in the spread under national control of reprocessing facilities for the atomic materials in nuclear power plants."

* * * * * * *

One urgent need is to step up American efforts to establish multi-national regional nuclear fuel centers. Spent but still radioactive fuel rods could thus be securely stored for possible future use, if reprocessing ever becomes safe and commercially feasible.

More important would be a genuine effort to provide the world with an assured supply of enriched uranium, a far cheaper fuel than plutonium would be even if the breeder reactor proved safe and commercially feasible by the 1990's. Neither this country nor the world can afford further delays in expanding uranium enrichment capacity.

Finally, it is essential that the United States hold firm in its thirty-year policy of refusing to spread nuclear weapons capability around the world, whatever the French and Germans do now. The pressures undoubtedly will be intense. A $7-billion reactor order from Iran is hung up right now on Washington's insistence that the site and form of plutonium reprocessing, if ever economic, be subject to joint agreement. To hold firm on this position and the American refusal to sell power reactors to Egypt—unless there is a guarantee that the spent fuel rods will be processed abroad—will be difficult unless a more vigorous effort is made to reverse French and West German policy or, at the very least, to obtain assurances that no further such sales will be made.

The alternative is a world of a dozen or more states brandishing their nuclear arsenals within the next decade, in such a circumstance, the threat of nuclear holocaust would be immeasurable.

Appendix B–7

Statement by Senator Stuart Symington, in the U.S. Senate, Concerning "Unwarranted Nuclear Secrecy", April 6, 1976

[Excerpted from the Congressional Record, Apr. 6, 1976, page S 5028]

Mr. President, for years now all of us on the Joint Atomic Energy Committee have known that the unnecessary secrecy which has pervaded and still pervades all aspects of our nuclear force effort has been detrimental to both the security and prosperity of the United States.

The latest practical illustration of the logic of this position is currently well demonstrated by the secrecy which surrounds the meetings of the seven countries that produce nuclear material; which countries, in unwarranted secrecy. have been meeting periodically in London.

The absurdity of this secrecy is now becoming a matter of world attention as well as something of deep concern to many of us in this country.

As but one illustration of the above, I ask unanimous consent that an article in "The Economist" of February 28, 1976, be printed in the Record at the end of these remarks.

Mr. President, the first sentence of the first paragraph of this article sums up the thrust of what we are saying. The sentence follows:

> Control of nuclear technology looks more and more endangered by undue secrecy, misplaced priorities in the less-developed countries, and the ambivalent role now played by the International Atomic Energy Agency (IAEA).

Exhibit No. 1

Nuclear Inspector or Salesman?

Control of nuclear technology looks more and more endangered by undue secrecy, misplaced priorities in the less-developed countries, and the ambivalent role now played by the International Atomic Energy Agency (IAEA). The case for overhaul of the agency is urgent, for it is now being asked to take on new responsibilities in a regrettably piecemeal way. Few any longer take much notice of the nuclear non-proliferation treaty.

On Tuesday Britian laid a proposal on the table of the agency's governing board in Vienna, which is a direct result of the cosmetic gentlemen's agreement concocted last month by the United States and six other nuclear-exporting countries. Britain suggests rewriting the standard IAEA agreements (usually signed by buyer and seller nations and by the agency) for supervision of nuclear sites. Ostensibly, the object is to make the rules more strict but in fact the new standard agreement, by replacing several alternative types now used, would merely be a simplification. Sellers of nuclear materials would not feel constrained (if they do now) in deals with nontreaty countries, and buyers would be saved from having to make a political display of their peaceful intentions by signing the treaty In short, Britain's proposal (on behalf of America, Canada, Denmark, Holland and Venezuela as well) lays the treaty to rest.

By definition, the agency's standard agreement will be technical and will therefore gloss over the buyer country's promise not to use nuclear know-how to make bombs. Those countries that objected to signing the nonproliferation treaty were anyway unlikely to sign IAEA agreements unless they thought their hands

would remain relatively free. But the agency has only 67 inspectors to cover some 400 atomic facilities worldwide. Nuclear power stations are popping up everywhere, and the agency will have to inspect at least 1,000 facilities by 1980. So, although new inspectors are being recruited, there will continue to be loopholes that cannot be plugged no matter how detailed the agency's mandate to supervise.

January's wide agreement is still secret. Weirdly, the secrecy extends even to the IAEA, which, although it would police the regulations, did not take part in the talks last year in London and has still not been formally notified of the outcome. However, the agreement is known to boil down to a vague commitment to forget about the treaty and to let nuclear peddlers sell their wares to anyone who is willing to accept standard IAEA safeguards. That does not seem much.

But the gentlemen's agreement could yet prove workable if the agency is able to move its regulatory operations into high gear. Its job is to detect any diversion of nuclear materials from commercial to military applications, but increasingly it has become more preoccupied with spreading commercial nuclear power than with regulating its uses. The agency now spends about a third of its $37m annual budget on site inspection and the supervision of health and safety regulations. These regulatory functions relate specifically to improper uses that might be made of commercial nuclear equipment or fuels. The remaining two-thirds of the budget goes on information and, notably technical assistance for developing nuclear power in the third woold. This is the IAEA's promotional business. It has grown tremendously in recent years.

Regulation and promotion are inconsistent. In 1974, the American Atomic Energy Commission was disbanded, and in its place two new bodies were created, one to license and regulate nuclear power plants, the other to encourage their construction through research and development. Since then, the new Nuclear Regulatory Commission has proved far stricter in its regulatory duties than the old commission had ever been, much to the displeasure of the nuclear industry and of electricity producers. Their resentment is perhaps the best barometer of the success of the commission as a regulatory body.

EXPENSIVE POWER, EASY BOMBS

Although officials in Vienna are certainly not trying to encourage weapons proliferation, they have become open partisans of greater use of nuclear power in the poor countries. The economics of nuclear power depend greatly on levels of interest rates and on assumed forward prices for other rates of energy, but at present the economic arguments tell against nulcear power except in the most populous and advanced countries of the third world, such as Brazil and Iran. Reactor types are generally too big for their needs. Now the IAEA is promoting smaller reactors and soliciting support from poor countries.

Furthermore, the agency is encouraging third-world countries to ask for a "nuclear power planning study" to assess the prospects for atomic energy. Pakistan, Bangladesh and Indonesia called in the IAEA early on, and the studies were completed last year. Others will follow. And although each of the studies is essentially an "energy audit," the common assumption is that, where at all possible, nuclear power should fill the gap between indigenous energy supplies and demand. That is a self-serving assumption to make, especially when a wide range of alternative energy sources, notably solar, are only now coming on line. It is also politically undesirable. Most northerners should not want a body that their taxpayers help finance to be persuading the General Amins of this world to make uneconomic decisions in favour of energy systems from which local nuclear bombs could be a byproduct.

There is an argument for providing information to the less-developed countries, but not for myopically promoting nuclear power in them. The sellers' cartel formed by the seven exporting countries, now trying to put some order into safeguard rules, should be the first to accept the need for the IAEA to spend all its time safeguarding, not promoting, the seven's exports. That is what Britain should have proposed this week.

73-642—76——7

Appendix B–8

Statement of Fred C. Ikle, Director, United States Arms Control and Disarmament Agency before the Subcommittee on Arms Control, International Organizations and Security Agreements, Committee on Foreign Relations, U.S. Senate, Monday, February 23, 1976

Mr. Chairman, and members of the Committee, I greatly appreciate this opportunity to appear before you.

This morning I would like to comment on two kinds of initiatives undertaken by the Arms Control and Disarmament Agency and the Executive Branch to deal with nuclear proliferation.

The first concerns nuclear exports, the second, multinational fuel centers.

The United States over the years has sought to work with other countries to insure that civil nuclear exports would be used only for peaceful purposes. We have recently had a number of bilateral and multilateral discussions with nuclear exporters to develop common rules on safeguards and export controls. As a result, the United States together with other exporters has decided to apply certain principles to our future nuclear exports. Most of these are consistent with current U.S. practice; some are new. All are designed to inhibit the spread of nuclear weapons while permitting nuclear exports of equipment to meet the world's growing energy needs. These principles include the following:

The requirement that recipients must apply international (IAEA) safeguards on all nuclear imports.

The requirement that the importer give assurances not to use these imports to make nulcear explosives for any purpose—whether called "peaceful" or not.

The requirement that the importer have adequate physical security for these nuclear facilities and materials to prevent theft and sabotage.

The requirement for assurances that the importers will demand the same conditions on any re-transfer of these materials or types of equipment to third countries.

Now, on the question of more sensitive exports—those which involve fuel enrichment, spent fuel reprocessing, and heavy water. We intend to use restraint in supply of these exports, particularly when we think they could add to the risk of proliferation.

In addition, in cases where we do export sensitive technology, we require that the importers obtain our consent before they re-transfer any sensitive nuclear technology to a third country.

These are the minimum standards the United States will apply to nuclear exports. We are prepared to be more stringent when appropriate.

Together with other leading exporters of nuclear technology, we are also committed to follow-up efforts along there lines.

1. To promote international cooperation in exchanging information on physical security, on measures of protection of nuclear material

in transit, and on measures for recovery of stolen nuclear material and equipment;

2. To improve the effectiveness of IAEA safeguards through special efforts that support that organization, and

3. To encourage the designers and makers of sensitive equipment to construct it in a way that will aid safeguards.

Mr. Chairman, the second kind of initiatives we are undertaking on physical security, on measures of protection of nuclear material.

3. To encourage the designers and makers of sensitive equipment to construct it in a way that will aid safeguards.

Mr. Chairman, the second kind of initiatives we are undertaking have to do with multinational fuel-cycle centers. The idea for such centers was promoted in the final declaration of the Review Conference of the Non-Proliferation Treaty held in Geneva last year. At the United Nations General Assembly last autumn, Secretary Kissinger stressed the grave danger of national reprocessing plants to nuclear proliferation and thus to world security, and proposed establishment of multinational fuel-cycle centers as a safer alternative to national control of reprocessing facilities.

The International Atomic Energy Agency has now begun a major study of the regional multinational center concept; the United States actively supports it, and I expect it will be completed sometime next year. Preliminary results suggest that large scale centers could bring significant economies of scale compared with smaller national reprocessing plants. But more important from my perspective—these centers may be an attractive alternative to national reprocessing plants, particularly for countries with more limited nuclear capacity. This alternative then may encourage countries to forego national reprocessing facilities and work together. This would make safeguards—and the protection of dangerous nuclear materials more effective. In short, if the concept proves successful, multinational centers should reduce the dangers of further nuclear proliferation and of nuclear terrorism.

The Arms Control and Disarmament Agency has strongly supported the IAEA study by supplying experts and consultants. We have also begun our own study on a broad range of related questions. One such question is whether new approaches to storing spent fuel could forestall premature national reprocessing; another is how to better manage transportation of nuclear materials. We are also beginning a preliminary study of the practical steps the U.S.—both government and industry—might take to advance the concept of multinational centers abroad.

I was asked recently why ACDA wishes to build reprocessing plants. The question indicates a misunderstanding of our objectives. Our efforts for multinational approaches should not be misunderstood: we do not wish to promote the reprocessing of Plutonium. On the contrary. Our hope, in all these efforts, is to investigate practical, economic alternatives to national reprocessing, and thereby reduce the growing dangers of nuclear proliferation.

Mr. Chairman, this completes my initial remarks. I would be pleased to answer your questions concerning these initiatives or any other aspects of our non-proliferation efforts, past or present.

Appendix B–9

Recap of Licensing Activity and Projection for Expected Applications

[Prepared by NRC]

A. Licenses Issued during Period May 1, 1975 to April 30, 1976 and License Applications Pending at April 30, 1976.

Type of case	Licenses issued May 1, 1975–Apr. 30, 1976	Applications pending at Apr. 30, 1976
Special nuclear material	153	72
Major cases	65	41
Minor cases	88	31
Source material	57	15
Major cases	7	4
Minor cases	50	11
Utilization facilities (reactors)	6	9
Byproduct materials	48	19
Total, all cases	264	115

B. Projection of Expected Applications for period May 1–August 1, 1976.

Based upon recent past experience, the receipt of applications for an additional 35 major cases (including special nuclear and source material and utilization facilities) and 45 minor cases (including special nuclear, source, and byproduct materials) may be expected in the three-month period from May 1 through August 1, 1976.

C. Definition of what is meant by Major and Minor cases.

1. Major Case

Any license application involving the following is considered to be a major case: (i) A utilization facility; (ii) One effective kilogram or more of U^{235}; (iii) One kilogram or more of plutonium or U^{233}; (iv) 10,000 kilograms or more of source materials; and (v) Any application not included in the above which is considered unusual or which involves a policy matter.

2. Minor Cases

Small quantities of special nuclear and source materials and byproduct materials.

Appendix B–10

Nuclear Export Licenses Issued May 1, 1975 to April 30, 1976

[Prepared by NRC]

Licensee	License number (XSNM–)	Material, (kilograms) Element	Isotope	Enrichment (percent)	Country of destination	Date of license
I. Major cases [1 or more effective kilograms U^{235}, plutonium, U^{233}]:						
General Atomic Co	710	23.269	4.639	20.0	West Germany	May 13, 1975
Mitsubishi International Corp.	716	15,364	507	3.3	Japan	July 2, 1975
Transnuclear, Inc	717	45.110	42.1	93.3	West Germany	July 3, 1975
Do	680	38.110	35.550	93.3	Netherlands	July 25, 1975
Marubeni America Corp	755	15,347	384	2.79	Japan	Aug. 8, 1975
Transnuclear, Inc	732	7,286.25	146.454	2.01	West Germany	Aug. 15, 1975
Do	724	32,614.26	1,043.656	3.2	do	Do.
Edlow International Co	754	22,153.23	590.88	3.55	Sweden	Aug. 8, 1975
Westinghouse Electric Corp.	692	22,550	1,014.7	4.5	Italy	Sept. 9, 9175
		130.5	Pu			
		2,385	U (depleted)			
Mitsubishi International Corp.	757	53,900	1,588	3.45	Japan	Sept. 12, 1975
Edlow International Co	768	85,887.31	1,762.65	2.52	Sweden	Sept. 17, 1975
Transnuclear, Inc	774	22,536.12	751.5	3.95	Belgium	Sept. 19, 1975
Edlow International Co	726	12,250.95	298.461	2.71	India	Sept. 23, 1975
General Electric Co	753	28,437	778	3.01	Japan	Sept. 26, 1975
Mitsui & Co. (U.S.A.) Inc	759	9,380	184	1.95	do	Do.
Westinghouse Electric Corp.	740	82,360	28,430	3.25	Korea	Oct. 4, 1975
U.S. Nuclear, Inc	689	46	42.918	93.3	Italy	Oct. 8, 1975
Transnuclear, Inc	695	33.100	30.883	93.3	France	Do.
Edlow International Co	[1] 726	Additional	9.055	2.71	India	Oct. 3, 1975
Transnuclear, Inc	775	20,863.80	688.51	3.3	Sweden	Oct. 15, 1975
Do	745	7,136	99.05	1.43	France	Do.
Do	791	16.040	14.965	93.3	Netherlands	Oct. 17, 1975
Do	769	10,683.15	379.2519	3.55	Belgium	Do.
U.S. Nuclear, Inc	704	88	82.104	93.3	Canada	Nov. 6, 1975
Transnuclear, Inc	784	179,633.7	6,017.729	3.35	Germany	Nov. 13, 1975
Do	756	35.820	33.420	93.3	do	Nov. 14, 1975
Do	712	3.263	3.0444	93.3	Netherlands	Nov. 26, 1975
Do	792	2.560	2.388	93.3	West Germany	Do.
Do	802	6,718.425	218.349	3.25	do	Do.
Edlow International Co	816	125,334.920	3,489.084	3.25	do	Dec. 17, 1975
Mitsubishi International Corp.	794	17,579	466	2.65	Japan	Dec. 22, 1975
Do	785	31,738	1,048	3.30	do	Do.
Transnuclear, Inc	801	13,621.77	429.09	3.15	Switzerland	Dec. 23, 1975
Do	720	48.120	44.896	93.3	West Germany	Dec. 30, 1975
General Electronic Technical Service Co.	836	13,500	370	3.1	Japan	Jan. 2, 1976
Transnuclear, Inc	746	148.37	138.43	93.3	France	Jan. 7, 1976
Do	718	15.038	14.030	93.3	Sweden	Jan. 8, 1976
Edlow International Co	793	4.5	4.135	93	Canada	Jan. 15, 1976
Transnuclear, Inc	819	66.767	63.294	93.3	France	Jan. 20, 1976
Do	825	83	77.44	93.3	West Germany	Jan. 28, 1976
General Electric Co	749	160,000	3,568	2.5	Japan	Do.
Mitsui & Co. (USA) Inc	788	19,793	350	3.07	do	Jan. 30, 1976
Do	815	25,166	689	3.01	do	Do.
General Electric Co	625	2.716	1.880	70	Yugoslavia	Feb. 2, 1976
Transnuclear, Inc	818	11,091.1	449.1	4.05	France	Feb. 5, 1976
Do	834	11,260.02	410.9908	3.65	Belgium	Do.
Do	828	12,840	430	3.35	Netherlands	Do.
Edlow International Co	840	76,642.32	2,028.66	3.15	Sweden	Do.
Transnuclear, Inc	688	25.070	23.390	93.3	Canada	Do.
Exxon Nuclear	851	5,160	125	2.80	West Germany	Feb. 13, 1976
Transnuclear, Inc	820	7,136	98.955	1.43	France	Do.
Do	741	23.760	22.2	93.3	Denmark	Mar. 3, 19766

See footnotes at end of table.

NUCLEAR EXPORT LICENSING ACTIONS TAKEN BY THE NUCLEAR REGULATORY COMMISSION, MAY 1, 1975 THROUGH JAN. 31, 1976

A. SPECIAL NUCLEAR MATERIAL

Licensee	License number (XSNM-)	Material (kilograms) Element	Material (kilograms) Isotope	Enrichment (percent)	Country of destination	Date of license
1. Major cases [1 or more effective kilograms U^{235}, plutonium, U^{233}]—Continued						
Edlow International Co	826	1.844	1.715	93	Japan	Mar. 8, 1976
Transnuclear, Inc	824	87, 164	2, 401.3	3.26	West Germany	Do.
Edlow International Co	814	22.35575	20.8579	93.3	do	Mar. 15, 1976
Transnuclear, Inc	842	15.040	14.032	93.3	do	Do.
Transnuclear, Inc	835	634.6	278.589	43.9	do	Mar. 17, 1976
		70.175	51.23	73		
		68.17	42.06	61.7		
		34.085	17.2	50.4		
General Electric Co	271	Additional				
	[2].02	53, 115	1, 654	3.1	Spain	Mar. 24, 1976
Transnuclear, Inc	841	341614	1, 043.7	3.2	West Germany	Mar. 25, 1976
Do	856	38, 100	35, 547.547	93.3	Netherlands	Mar. 31, 1976
U.S. Nuclear	704	Additional900				
	[2].02	55	51.315	93.3	Canada	Apr. 1, 1976
Transnuclear, Inc	855	184, 038.615	5, 266.577	3.3	France	Apr. 5, 1976
General Atomic Corp	703	3.492	2.488	70	Mexico	Apr. 8, 1976
Transnuclear, Inc	864	903.706	22.549	3.504	West Germany	Apr. 29, 1976
Do	869	18, 800	630	3.35	do	Apr. 30, 1976

[1] Amendment 1.
[2] Amendment.

B. SOURCE MATERIAL

Licensee	License No.	Material (in pounds)	Destination	Date issued
I. Major Cases [10,000 kilograms or more of uranium or thorium]:				
Edlow International Co	SUE-8254	89, 040 U	West Germany	Aug. 27, 1975
Do	SUE-8257	356,160 U	do	Do.
Do	SUE-8258	265,785 U	Netherlands	Aug. 29, 1975
Continental Oil Co	SUE-8287	212,000 U	Canada	Feb. 20, 1976
Transnuclear, Inc	SUE-8293	57,569 kgs U	West Germany	Do.
Do	SUE-8303	2,032,704	Italy	Apr. 8, 1976
Edlow International Co	SUE-8304	203,520	United Kingdom	Apr. 20, 1976

UTILIZATION FACILITIES (REACTORS)

Licensee	License No.	Facility	Destination	Date Issued
General Electric Technical Services, Co., Inc., San Jose, Calif.	XR-77, amend. 03	Amendment to extend expiration date of license and increase value by $1,500,000 for 2,436 MW(t) reactor.	Ente Nazionale per l'Energia Elettricas (ENEL) Rome, Italy.	July 8, 1975
Westinghouse Electric Corp., Pittsburgh, Pa.	XR-103, docket 50-533	2,783 MW(t) PWR	Statens Vattenfallsverk, Stockholm, Sweden.	Oct. 21, 1975
Institute for Resource Management, Inc., Bethesda, Md.	XR-105, docket 50-534	Aerojet Nuclear Corp., model AGN 201-109, research reactor.	Kyung Hee University, Seoul, Korea.	Nov. 18, 1975
General Electric Technical Services Co., Inc., San Jose, Calif.	XR-104, docket 50-536	3,012 MW(t) BWR	Kernkraftwerk Leibstadtag, Zurich, Switzerland.	Dec. 31, 1975
General Atomic Corp	XR-108, docket 50-541	250 KW(t) TRIGA MARK II Research.	Technical University of Istanbul, Turkey.	Mar. 24, 1976
General Electric Co	XR-80, amend. 02	Increase value to $50,000,000 total.	Taiwan Power Co., Taipei, Taiwan.	Apr. 30, 1976

Appendix B–11

Pending Nuclear Export Licenses as of April 30, 1976

[Prepared by NRC]

SPECIAL NUCLEAR MATERIAL—MAJOR CASE

Name of applicant	Date of application, date received, license number, S- number	Quantity and kind of material (kilograms)			Usage	Country of destination
		Element	Isotope	Percent		
U. S. Nuclear	——, Apr. 4, 1975, XSNM–690, S–None, amendment 02	Additional 25.7135.	Additional 23.8594.	93.3	Fuel, Safari–1	Republic of South Africa.
General Electric	Apr. 4, 1975, Apr. 14, 1975, XSNM–744, S–47	2.48, 61	Plutonium natural Uranium.		Store recovered material for future use.	Italy.
Edlow International	July 29, 1975, Aug. 6, 1975, XSNM–805, S–123	3,055.20	82.8	2.71	Tarapur	India.
General Electric	Feb. 5, 1975, Feb. 10, 1975, XSNM–711, S–19	2.8	1.960	70	Fuel, Tsing Huw open-pool	Republic of China.
Westinghouse Electric	Oct. 27, 1975, Nov. 4, 1975, XSNM–844, S–198	146,345	3,830	3.14	Initial core Alamaraz 1 and 2	Spain.
Edlow International	Oct. 21, 1975, Nov. 5, 1975, XSNM–845, S–199	18,371.4	463.64	2.71	Tarapur Atomic Power Station	India.
Marubeni America	Nov. 3, 1975, Nov. 12, 1975, XSNM–846, S–209	17,895	471	2.87	Fuel, Shimane No. 1	Japan.
General Electric Co	Nov. 7, 1975, Nov. 14, 1975, XSNM–852, S–214	47,147	1,235	3.1	Fuel, for Garigliano	Italy.
Edlow International	Dec. 8, 1975, Dec. 10, 1975, XSNM–858, S–225	3,567	112.36	3.15	Fuel region 5, Genkai unit No. 1	Japan.
Westinghouse	Dec. 11, 1975, Dec. 16, 1975, XSNM–861, S–233	144,934	3,830	3.14	Fuel, Unit I and II, Lemoniz	Spain.
Mitsubishi	Dec. 9, 1975, Dec. 16, 1975, XSNM–862, S–234	17,502	552	3.15	Fuel, Genkai unit No. 1	Japan.
Westinghouse Electric	Dec. 18, 1975, Dec. 22, 1975, XSNM–865, S–240	73,173	1,915	3.14	Fuel, Asco unit No. 2	Spain.
Do	Dec. 18, 1975, Dec. 22, 1975, XSNM–866, S–241	73,173	1,915	3.14	Fuel, Asco unit No. 1	Do.
Transnuclear	Jan. 23, 1976, Jan. 23, 1976, XSNM–876, S–260	5.954	5.463	93.3	Fuel, Ber II	West Germany.
Mitsubishi	Jan. 22, 1976, Jan. 27, 1976, XSNM–877, S–262	29.849	986	3.3	Fuel, Mihama III	Japan.
Transnuclear	Jan. 27, 1976, Jan. 27, 1976, XSNM–879, S–264	127.318	118.788	93.3	CEA facilities	France.
Do	Feb. 10, 1976, Feb. 10, 1976, SXNM–881, S–270	20.05	18.7067	93.3	R2 Studsvik	Sweden.
Mitsubishi	Jan. 23, 1976, Jan. 27, 1976, SXNM–889, S–280	29.849	986	3.3	Fuel, Takahama No. II	Japan.
U.S. Nuclear	Feb. 13, 1976, Feb. 19, 1976, XSNM–883, S–273	4.84	4.5	93.3	Loading critical assembly machine for training and research.	Israel.
Westinghouse	Feb. 23, 1976, Feb. 25, 1976, XSNM–887, S–277	146,362	3,874	3.15	Ringhals 3 and 4	Sweden.
General Atomic	Feb. 13, 1976, Feb. 17, 1976, XSNM–885, S–291	58, 46, 20 GM, 6 Cl AM–241.	53.94, 9.20, 18.6 GM.	93 20 93	Fuel element, fission chambers, startup sources for Triga.	Romania.
Edlow International	Mar. 2, 1976, Mar. 5, 1976, XSNM–891, S–287	84,905	2,355	3.55	2d reload Oskarshamn unit II	Sweden.

SPECIAL NUCLEAR MATERIAL—MAJOR CASE—Continued

Name of applicant	Date of application, date received, license number, S- number	Quantity and kind of material (kilograms)			Usage	Country of destination
		Element	Isotope	Percent		
Transnuclear	Mar. 9, 1976, Mar. 11, 1976, XSNM-892, S-294	34,575	1,082	3.13	Fuel elements unterweser	West Germany.
Do	Mar. 9, 1976, Mar. 11, 1976, XSNM-893, S-295	3.0075	2.806	93.3	Working Stock Didi, Merlin, HFR, RHF, and R-2 Studsvik.	Do.
Do	Mar. 9, 1976, Mar. 11, 1976, XSNM-894, S-296	2.005	1.871	93.3	Fuel elements, Rhapsodie	West Germany.
Edlow International	Mar. 17, 1976, Mar. 24, 1976, XSNM-897, S-307	32,000	896.0	3.55	1st reload, Barseback unit 2	Sweden.
Do	Mar. 15, 1976, Mar. 25, 1976, XSNM-898, S-309	43,757	1,233.6	3.55	Reload for Barseback unit I	Do.
Transnuclear	Mar. 26, 1976, Mar. 26, 1976, XSNM-900, S-310	180	167.94	93.3	Fuel fabrica-research reactor, Upton, N.Y.	West Germany.
Do	Mar. 30, 1976, Mar. 30, 1976, XSNM-901, S-315	819.075	22.82	3.0	Fuel, Vak	Do.
Mitsui & Co	Mar. 26, 1976, Apr. 1, 1976, XSNM-903, S-314	116.269	2.679	3.01	Fuel, Hamodka unit No. 2	Japan.
Do	Apr. 2, 1976, Apr. 9, 1976, XSNM-906, S-322	12,682	358	3.07		Do.
Edlow International	Mar. 17, 1976, Apr. 12, 1976, XSNM-907, S-324	127,933.50	2,736.33	2.41	Fuel, Forsmark unit 1	Sweden.
Westinghouse	April 6, 1976, April 12, 1976, XSNM-908, S-326	183,634	4,880	3.15	1st cores and spares for No. 1 and 2 OH 1.	Japan.
Do	April 9, 1967, April 14, 1976, XSNM-909, S-327	51,889	1,392	3.15		Brazil.
Edlow International	April 13, 1976, April 15, 1976, XSNM-912, S-331	136,400	3,600	3.55	1st core and reload for Ringhals IV.	Sweden.
Do	April 13, 1976, April 15, 1976, XSNM-913, S-332	53,090	1,690	3.55	Reload, Rinhals III	Do.
Do	April 13, 1976, April 15, 1976, XSNM-914, S-333	144,800	3,000	3.55	1st core for Forsmark II	Do.
Do	April 13, 1976, April 15, 1976, XSNM-915, S-334	142,900	3,260	3.55	1st core for Forsmark III	Do.
Do	April 13, 1976, April 15, 1976, XSNM-916, S-335	124,400	3,480	3.55	Reload, Ringhals I	Do.
Westinghouse	April 2, 1976, April 16, 1976, XSNM-318, S-336	15,219	684.55	4.5	Conversion by BNFL for return to United States.	United Kingdom.
Transnuclear	April 29, 1976, April 30, 1976, XSNM-923, S-345	14,158	389.72	3.0		West Germany.

SOURCE MATERIAL—MAJOR CASE

Name of applicant	Date of application, date received, license number, S-number	Quantity and kind of material	Usage	Country of destination
N L Industries	Sept. 22, 1975, Sept. 22, 1975, SUE-8294, S-160	100,000 lbs. of depleted uranium	Shielding—Medical and industrial	United Kingdom.
The Boeing Co	Oct. 31, 1975, Nov. 5, 1975, SUE-8302, S-206	1,000,000 lbs. depleted uranium	Aircraft counterweights	List of free countries.
Transnuclear Inc	Feb. 10, 1976, Feb. 10, 1976, SUE-8320, S-269	40,400 kgs. depleted uranium	Shielding parts in medical equipment	West Germany.
Union Carbide	Apr. 1, 1976, Apr. 6, 1976, SUE-8328, S-318	296,890 lbs. uranium in 350,000 lbs. normal U_3O_8.	Conversion to UF6 for return to United States.	Canada.

REACTORS—MAJOR CASE

Westinghouse	Jan. 25, 1974, Jan. 28, 1974, 50-474, XR-99, S-11	A 2,696 megawatt thermal pressurized water reactor. ASCO II.	Power	Spain.
General Electric Co	Oct. 9, 1975, Oct. 17, 1975, 50-551, XR-110, S-179	2 boiling water reactors each 2,894 megawatt thermal.	do	Do.
General Atomic Co	May 21, 1975, June 2, 1975, 50-542, XR-109, S-62	1,000 kw thermal reactor	Research	Iran.
Atomics International	Apr. 18, 1975, Apr. 23, 1974, 50-589, XR-106, S-18	A 200-watt research reactor	do	Israel.
Westinghouse Electric Corp	Apr. 28, 1975, May 7, 1975, 50-540, XR-107, S-16	An 1,876 megawatt thermal KRSKO	Power	Yugoslavia.
General Electric and General Electric Technical Services Co.	Oct. 20, 1975, Oct. 29, 1975, 50-552, XR-111, S-201	2 boiling water reactors. ENEL VI, ENEL VIII.	do	Italy.
General Atomic Co	Dec. 5, 1975, Dec. 22, 1975, 50-555, XR-112, S-237	2,000 kW research reactor	Educational and research	Thailand.
Westinghouse Electric Corp	Jan. 7, 1976, Jan. 19, 1976, 50-508, XR-113, S-259	2 power 2,785 megawatt thermal, TAI power-5, TAI power-6.	Power	Taiwan.
Babcock & Wilcox	Apr. 23, 1975, Apr. 29, 1976, 50-, XR-115, S-	A 314 megawatt pressurized water reactor	do	Canada.

APPENDIX C

Arms Control

Appendix C–1

Nuclear Test Ban Treaty

Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water; Done at Moscow, U.S.S.R., on August 5, 1963; Ratification advised by the Senate September 24, 1963; Ratified by the President of the United States October 7, 1963; Ratifications of the Governments of the United States, the United Kingdom of Great Britain and Northern Ireland, and the Union of Soviet Socialist Republics deposited with the said Governments at Washington, London, and Moscow October 10, 1963; Proclaimed by the President October 10, 1963; Entered into Force October 10, 1963.

The Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland, and the Union of Soviet Socialist Republics, hereinafter referred to as the "Original Parties",

Proclaiming as their principal aim the speediest possible achievement of an agreement on general and complete disarmament under strict international control in accordance with the objectives of the United Nations which would put an end to the armaments race and eliminate the incentive to the production and testing of all kinds of weapons, including nuclear weapons,

Seeking to achieve the discontinuance of all test explosions of nuclear weapons for all time, determined to continue negotiations to this end, and desiring to put an end to the contamination of man's environment by radioactive substances,

Have agreed as follows:

ARTICLE I

1. Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, on any other nuclear explosions at any place under its jurisdiction or control:

(a) in the atmosphere; beyond its limits, including outer space; or underwater, including territorial waters or high seas; or

(b) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted.

It is understood in this connection that the provisions of this subparagraph are without prejudice to the conclusion of a treaty resulting in the permanent banning of all nuclear test explosions, including all such explosions underground, the conclusion of which, as the Parties have stated in the Preamble to this Treaty, they seek to achieve.

2. Each of the Parties to this Treaty undertakes furthermore to refrain from causing, encouraging, or in any way participating in, the carrying out of any nuclear weapon test explosion, or any other nuclear explosion, anywhere which would take place in any of the environments described, or have the effect referred to, in paragraph 1 of this Article.

ARTICLE II

1. Any Party may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to this Treaty. Thereafter, if requests to do so by one-third or more of the Parties, the Depositary Governments shall convene a conference to which they shall invite all the Parties, to consider such amendment.

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to this Treaty, including the votes of all of the Original Parties. The amendment shall enter into force for all Parties upon the deposit of instruments of ratification by a majority of all the Parties, including the instruments of ratification of all of the Original Parties.

ARTICLE III

1. This Treaty shall be open to all States for signature. Any State which does not sign this Treaty before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.

2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the Original Parties—the United States of America, the United Kingdom of Great Britain and Northern Ireland, and the Union of Soviet Socialist Republics—which are hereby designated the Depositary Governments.

3. This Treaty shall enter into force after its ratification by all the Orginal Parties and the deposit of their instruments of ratification.

4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification of and accession to this Treaty, the date of its entry into force, and the date of receipt of any requests for conferences or other notices.

6. This Treaty shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

ARTICLE IV

This Treaty shall be of unlimited duration.

Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty three months in advance.

ARTICLE V

This Treaty, of which the English and Russian texts are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

In witness whereof the undersigned, duly authorized, have signed this Treaty.

Done in triplicate at the city of Moscow the fifth day of August, one thousand nine hundred and sixty-three.

Appendix C–2

Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapons Tests: July 3, 1974

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to take effective measures toward reductions in strategic arms, nuclear disarmament, and general and complete disarmament under strict and effective international control.

Recalling the determination expressed by the Parties to the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water in its preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time, and to continue negotiations to this end,

Noting that the adoption of measures for the further limitation of underground nuclear weapon tests would contribute to the achievement of these objectives and would meet the interests of strengthening peace and the further relaxation of international tension,

Reaffirming their adherence to the objectives and principles of the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water and of the Treaty on the Non-Proliferation of Nuclear Weapons,

Have agreed as follows:

ARTICLE I

1. Each Party undertakes to prohibit, to prevent, and not to carry out any underground nuclear weapon test having a yield exceeding 150 kilotons at any place under its jurisdiction or control, beginning March 31, 1976.

2. Each Party shall limit the number of its underground nuclear weapon tests to a minimum.

3. The Parties shall continue their negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear weapon tests.

ARTICLE II

1. For the purpose of providing assurance of compliance with the provisions of the Treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with the generally recognized principles of international law.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.

3. To promote the objectives and implementation of the provisions of this Treaty the Parties shall, as necesasry, consult with each other; make inquiries and furnish information in response to such inquiries.

ARTICLE III

The provisions of this Treaty do not extend to underground nuclear explosions carried out by the Parties for peaceful purposes. Underground nuclear explosions for peaceful purposes shall be governed by an agreement which is to be negotiated and concluded by the Parties at the earliest possible time.

ARTICLE IV

This Treaty shall be subject to ratification in accordance with the constitutional procedures of each Party. This Treaty shall enter into force on the day of the exchange of instruments of ratification.

ARTICLE V

1. This Treaty shall remain in force for a period of five years. Unless replaced earlier by an agreement in implementation of the objectives specified in paragraph 3 of Article I of this Treaty, it shall be extended for successive five-year periods unless either Party notifies the other of its termination no later than six months prior to the expiration of the Treaty. Before the expiration of this period the Parties may, as necessary, hold consultations to consider the situation relevant to the substance of this Treaty and to introduce possible amendments to the next of the Treaty.

2. Each Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. It shall give notice of its decision to the other Party six months prior to withdrawal from this Treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.

3. This Treaty shall be registered pursuant to Article 102 of the Charter of the United Nations.

Done at Moscow on July 3, 1974, in duplicate, in the English and Russian languages, both texts being equally authentic.

For the United States of America:

THE PRESIDENT OF THE
UNITED STATES OF AMERICA.

For the Union of Soviet Socialist Republics:

GENERAL SECRETARY OF THE
CENTRAL COMMITTEE OF THE CPSU.

PROTOCOL TO THE TREATY BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE LIMITATION OF UNDERGROUND WEAPONS TESTS

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Having agreed to limit underground nuclear weapons tests,

Having agreed as follows:

1. For the purpose of ensuring verification of compliance with the obligations of the Parties under the Treaty by national technical means, the Parties shall, on the basis of reciprocity, exchange the following data:

a. The geographic coordinates of the boundaries of each test site and of the boundaries of the geophysically distinct testing areas therein.

b. Information on the geology of the testing areas of the sites (the rock characteristics of geological formations, and the basic physical properties of the rock, i.e., density, seismic velocity, water saturation, porosity and depth of water table).

c. The geographic coordinates of underground nuclear weapons tests, after they have been conducted.

d. Yield, date, time, depth and coordinates for two nuclear weapons tests for calibration purposes from each geophysically distinct testing area where underground nuclear weapons tests have been and are to be conducted. In this connection the yield of such explosions for calibration purposes should be as near as possible to the limit defined in Article I of the Treaty and not less than one-tenth of that limit. In the case of testing areas where data are not available on two tests for calibration purposes, the data pertaining to one such test shall be exchanged, if available, and the data pertaining to the second test shall be exchanged as soon as possible after a second test having a yield in the abovementioned range. The provisions of the Protocol shall not require the Parties to conduct tests solely for calibration purposes.

2. The Parties agree that the exchange of data pursuant to subparagraphs a, b, and d of paragraph 1 shall be carried out simultaneously with the exchange of instruments of ratification of the Treaty, as provided in Article IV of the Treaty, having in mind that the Parties shall, on the basis of reciprocity, afford each other the opportunity to familiarize themselves with these data before the exchange of instruments of ratification.

3. Should a Party specify a new test site or testing are after the entry into force of the Treaty, the data called for by subparagraphs a and b of paragraph 1 shall be transmitted to the other Party in advance of use of that site or area. The data called for by subparagraph d of paragraph 1 shall also be transmitted in advance of use of that site or area if they are available; if they are not available, they shall be transmitted as soon as possible after they have been obtained by the transmitting Party.

4. The Parties agree that the test sites of each Party shall be located at places under its jurisdiction or control and that all nuclear weapons tests shall be conducted solely within the testing areas specified in accordance with paragraph 1.

5. For the purposes of the Treaty, all underground nuclear explosions at the specified test sites shall be considered nuclear weapons tests and shall be subject to all the provisions of the Treaty relating to nuclear weapon tests. The provisions of Article III of the Treaty apply to all underground nuclear explosions conducted outside of the specified test sites, and only to such explosions.

This Protocol shall be considered an integral party of the Treaty.
Done at Moscow on July 3, 1974.

For the United States of America:

THE PRESIDENT OF THE
UNITED STATES OF AMERICA.

For the Union of Soviet Socialist Republics:

GENERAL SECRETARY OF THE
CENTRAL COMMITTEE OF THE CPSU.

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Appendix C–3

Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties.

Proceeding from a desire to implement Article III of the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, which calls for the earliest possible conclusion of an agreement on underground nuclear explosions for peaceful purposes.

Reaffirming their adherence to the objectives and principles of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, the Treaty on Non-Proliferation of Nuclear Weapons, and the Treaty on the Limitation of Underground Nuclear Weapons Tests, and their determination to observe strictly the provisions of these international agreements.

Desiring to assure that undergound nuclear explosions for peaceful purposes shall not be used for purposes related to nuclear weapons,

Desiring that utilization of nuclear energy be directed only toward peaceful purposes,

Desiring to develop appropriately cooperation in the field of underground nuclear explosions for peaceful purposes,

Have agreed as follows:

ARTICLE I

1. The Parties enter into this Treaty to satisfy the obligations in Article III of the Treaty on the Limitation of Underground Nuclear Weapon Tests, and assume additional obligations in accordance with the provisions of this Treaty.

2. This Treaty shall govern all underground nuclear explosions for peaceful purposes conducted by the Parties after March 31, 1976.

ARTICLE II

For the purposes of this Treaty:

(a) "explosion" means any individual or group underground nuclear explosion for peaceful purposes;

(b) "explosive" means any device, mechanism or system for producing an individual explosion;

(c) "group explosion" means two or more individual explosions for which the time interval between successive individual explosions does not exceed five seconds and for which the emplacement points of all explosives can be interconnected by straight line segments, each of which joins two emplacement points and each of which does not exceed 40 kilometers.

ARTICLE III

1. Each Party, subject to the obligations assumed under this Treaty and other international agreements, reserves the right to:

(a) carry out explosions at any place under its jurisdiction or control outside the geographical boundaries of test sites specified under the provisions of the Treaty on the Limitation of Underground Nuclear Weapon Tests; and

(b) carry out, participate or assist in carrying out explosions in the territory of another State at the request of such other State.

2. Each Party undertakes to prohibit, to prevent and not to carry out at any place under its jurisdiction or control, and further undertakes not to carry out, participate or assist in carrying out anywhere:

(a) any individual explosion having a yield exceeding 150 kilotons;

(b) any group explosion:

(1) having an aggregate yield exceeding 150 kilotons except in ways that will permit identification of each individual explosion and determination of the yield of each individual explosion in the group in accordance with the provisions of Article IV of and the Protocol to this Treaty:

(2) having an aggregate yield exceeding one and one-half megatons;

(c) any explosion which does not carry out a peaceful application.

(d) any explosion except in compliance with the provisions of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, In Outer Space and Under Water, the Treaty on the Non-Proliferation of Nuclear Weapons, and other international agreements entered into by that Party.

3. The question of carrying out any individual explosion having a yield exceeding the yield specified in paragraph 2(a) of this article will be considered by the Parties at an appropriate time to be agreed.

ARTICLE IV

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall:

(a) use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law; and

(b) provide to the other Party information and access to sites of explosions and furnish assistance in accordance with the provisions set forth in the Protocol to this Treaty.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1(a) of this article, or with the implementation of the provisions of paragraph 1(b) of this article.

ARTICLE V

1. To promote the objectives and implementation of the provisions of this Treaty, the Parties shall establish promptly a Joint Consultative Commission within the framework of which they will:

(a) consult with each other, make inquiries and furnish information in response to such inquiries, to assure confidence in compliance with the obligations assumed;

(b) consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous;

(c) consider questions involving unintended interference with the means for assuring compliance with the provisions of this Treaty;

(d) consider changes in technology or other new circumstances which have a bearing on the provisions of this Treaty; and

(e) consider possible amendments to provisions governing underground nuclear expolsions for peaceful purposes.

2. The Parties through consultation shall establish, and may amend as appropriate, Regulations for the Joint Consultative Commission governing procedures, composition and other relevant matters.

ARTICLE VI

1. The Parties will develop cooperation on the basis of mutual benefit, equality, and reciprocity in various areas related to carrying out underground nuclear explosions for peaceful purposes.

2. The Joint Consultative Commission will facilitate this cooperation by considering specific areas and forms of cooperation which shall be determined by agreement between the Parties in accordance with their constitutional procedures.

3. The Parties will appropriately inform the International Atomic Energy Agency of results of their cooperation in the field of underground nuclear explosions for peaceful purposes.

ARTICLE VII

1. Each Party shall continue to promote the development of the international agreement or agreements and procedures provided for in Article V of the Treaty on the Non-Proliferation of Nuclear Weapons, and shall provide appropriate assistance to the International Atomic Energy Agency in this regard.

2. Each Party undertakes not to carry out, participate or assist in the carrying out of any explosion in the territory of another State unless that State agrees to the implementation in its territory of the international observation and procedures contemplated by Article V of the Treaty on the Non-Proliferation of Nuclear Weapons and the provisions of Article IV of the Protocol to this Treaty, including the provision by that State of the assistance necessary for such implementation and of the privileges and immunities specified in the Protocol.

ARTICLE VIII

1. This Treaty shall remain in force for a period of five years, and it shall be extended for successive five-year periods unless either Party notifies the other of its termination no later than six months prior to its expiration. Before the expiration of this period the Parties may, as necessary, hold consultations to consider the situation relevant to the substance of this Treaty. However, under no circumstances shall

either Party be entitled to terminate this Treaty while the Treaty on the Limitation of Underground Nuclear Weapon Tests remains in force.

2. Termination of the Treaty on the Limitation of Underground Nuclear Weapon Tests shall entitle either Party to withdraw from this Treaty at any time.

3. Each Party may propose amendments to this Treaty. Amendments shall enter into force on the day of the exchange of instruments of ratification of such amendments.

ARTICLE IX

1. This Treaty including the Protocol which forms an integral part hereof, shall be subject to ratification in accordance with the constitutional procedures of each Party. This Treaty shall enter into force on the day of the exchange of instruments of ratification which exchange shall take place simultaneously with the exchange of instruments of ratification of the Treaty on the Limitation of Underground Nuclear Weapon Tests.

2. This Treaty shall be registered pursuant to Article 102 of the Charter of the United Nations.

Done at Washington and Moscow, on May 28, 1976, in duplicate, in the English and Russian languages, both texts being equally authentic.

For the United States of America:

GERALD R. FORD,
The President of the United States of America.

For the Union of Soviet Socialist Republics:

L. I. BREZHNEV,
General Secretary of the Central Committee of the CPSU.

PROTOCOL TO THE TREATY BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON UNDERGROUND NUCLEAR EXPLOSIONS FOR PEACEFUL PURPOSES

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Having agreed to the provisions in the Treaty on Underground Nuclear Explosions for Peaceful Purposes, hereinafter referred to as the Treaty,

Have agreed as follows:

ARTICLE I

1. No individual explosion shall take place at a distance, in meters, from the ground surface which is less than 30 times the 3.4 root of its planned yield in kilotons.

2. Any group explosion with a planned aggregate yield exceeding 500 kilotons shall not include more than five individual explosions, each of which has a planned yield not exceeding 50 kilotons.

ARTICLE II

1. For each explosion, the Party carrying out the explosion shall provide the other Party:

(a) not later than 90 days before the beginning emplacement of the explosives when the planned aggregate yield of the explosion does not exceed 100 kilotons, or not later than 180 days before the beginning of emplacement of the explosives when the planned aggregate yield of the explosion exceeds 100 kilotons, with the following information to the extent and degree of precision available when it is conveyed;

(1) the purpose of the planned explosion;

(2) the location of the explosion expressed in geographical coordinates with a precison of four or less kilometers, planned date and aggregate yield of the explosion;

(3) the types or types of rock in which the explosion will be carried out, including the degree of liquid saturation of the rock at the point of emplacement of each explosive; and

(4) a description of specific technological features of the project, of which the explosion is a part, that could influence the determination of its yield and confirmation of purpose; and

(b) not later than 60 days before the beginning of emplacement of the explosives the information specified in subparagraph 1(a) of this article to the full extent and with the precision indicated in that subparagraph.

2. For each explosion with a planned aggregate yield exceeding 50 kilotons, the Party carrying out the explosion shall provide the other Party, not later than 60 days before the beginning of emplacement of explosives, with the following information:

(a) the number of explosives, the planned yield of each explosive, the location of each explosive to be used in a group explosion relative to all other explosives in the group with a precision of 100 or less meters, the depth of emplacement of each explosive with a precision of one meter and the time intervals between individual explosions in any group explosion with a precision of one-tenth second; and

(b) a description of specific features of geological structure or other local conditions that could influence the determination of the yield.

3. For each explosion with a planned aggregate yield exceeding 75 kilotons, the Party carrying out the explosion shall provide the other Party, not later than 60 days before the beginning of emplacement of the explosives, with a description of the geological and geophysical characteristics of the site of each explosion which could influence determination of the yield, which shall include: the depth of the water table; a stratigraphic column above each emplacement point; the position of each emplacement point relative to nearby geological and other features which influenced the design of the project of which the explosion is a part; and the physical parameters of the rock, including density, seismic velocity, porosity, degree of liquid saturation, and rock strength, within the sphere centered on each emplacement point and having a radius, in meters, equal to 30 times the cube root of the planned yield in kilotons of the explosive emplaced at that point.

4. For each explosion with a planned aggregate yield exceeding 100 kilotons, the Party carrying out the explosion shall provide the other Party, not later than 60 days before the beginning of emplacement of the explosives, with:

(a) information on locations and purposes of facilities and installations which are associated with the conduct of the explosion;

(b) information regarding the planned date of the beginning of emplacement of each explosive; and

(c) a topographic plan in local coordinates of the areas specified in paragraph 7 of Article IV, at a scale of 1: 24,000 or 1: 25,000 with a contour interval of 10 meters or less.

5. For application of an explosion to alleviate the consequences of an emergency situation involving an unforeseen combination of circumstances which calls for immediate action for which it would not be practicable to observe the timing requirements of paragraphs 1, 2 and 3 of this article, the following conditions shall be met:

(a) the Party carrying out an explosion for such purposes shall inform the other Party of that decision immediately after it has been made and describe such circumstances;

(b) the planned aggregate yield of an explosion for such purpose shall not exceed 100 kilotons; and

(c) the Party carrying out an explosion for such purpose shall provide to the other Party the information specified in paragraph 1 of this article, and the information specified in paragraphs 2 and 3 of this article if applicable, after the decision to conduct the explosion is taken, but not later than 30 days before the beginning of emplacement of the explosives.

6. For each explosion, the Party carrying out the explosion shall inform the other Party, not later than two days before the explosion, of the planned time of detonation of each explosive with a precision of one second.

7. Prior to the explosion, the Party carrying out the explosion shall provide the other Party with timely notification of changes in the information provided in accordance with this article.

8. The explosion shall not be carried out earlier than 90 days after notification of any change in the information provided in accordance with this article which requires more extensive verification procedures than those required on the basis of the original information, unless an earlier time for carrying out the explosion is agreed between the Parties.

9. Not later than 90 days after each explosion the Party carrying out the explosion shall provide the other Party with the following information:

(a) the actual time of the explosion with a precision of one-tenth second and its aggregate yield;

(b) when the planned aggregate yield of a group explosion exceeds 50 kilotons, the actual time of the first individual explosion with a precision of one-tenth second, the time interval between individual explosions with a precision of one millisecond and the yield of each individual explosion; and

(c) confirmation of other information provided in accordance with paragraphs 1, 2, 3 and 4 of this article and explanation of any changes or corrections based on the results of the explosion.

10. At any time, but not later than one year after the explosion, the other Party may request the Party carrying out the explosion to clarify any item of the information provided in accordance with this article. Such clarification shall be provided as soon as practicable, but not later than 30 days after the request is made.

ARTICLE III

1. For the purposes of this Protocol:

(a) "designated personnel" means those nationals of the other Party identified to the Party carrying out an explosion as the persons who will exercise the rights and functions provided for in the Treaty and this Protocol; and

(b) "emplacement hole" means the entire interior of any drill-hole, shaft, adit or tunnel in which an explosive and associated cables and other equipment are to be installed.

2. For any explosion with a planned aggregate yield exceeding 100 kilotons but not exceeding 150 kilotons if the Parties, in consultation based on information provided in accordance with Article II and other information that may be introduced by either Party, deem it appropriate for the confirmation of the yield of the explosion, and for any explosion with a planned aggregate yield exceeding 150 kilotons, the Party carrying out the explosion shall allow designated personnel within the areas and at the locations described in Article V to exercise the following rights and functions:

(a) confirmation that the local circumstances, including facilities and installations associated with the project, are consistent with the stated peaceful purposes;

(b) confirmation of the validity of the geological and geophysical information provided in accordance with Article II through the following procedures:

(1) examination by designated personnel of research and measurement data of the Party carrying out the explosion and of rock core or rock fragments removed from each emplacement hole, and of any logs and drill core from existing exploratory holes which shall be provided to designated personnel upon their arrival at the site of the explosion;

(2) examination by designated personnel of rock fragments as they become available in accordance with the procedures specified in subparagraph 2(b)(3) of this article; and

(3) observation by designated personnel of implementation by the Party carrying out the explosion of one of the following four procedures, unless this right is waived by the other Party:

(i) construction of that portion of each emplacement hole starting from a point nearest the entrance of the emplacement hole which is at a distance, in meters, from the nearest emplacement point equal to 30 times the cube root of the planned yield in kilotons of the explosive to be emplaced at that point and continuing to the completion of the emplacement hole; or

(ii) construction of that portion of each emplacement hole starting from a point nearest the entrance of the

emplacement hole which is at a distance, in meters, from the nearest emplacement point equal to six times the cube root of the planned yield in kilotons of the explosive to be emplaced at that point and continuing to the completion of the emplacement hole as well as the removal of rock core or rock fragments from the wall of an existing exploratory hole, which is substantially parallel with and at no point more than 100 meters from the emplacement hole, at locations specified by designated personnel which lie within a distance, in meters, from the same horizon as each emplacement point of 30 times the cube root of the planned yield in kilotons of the explosive to be emplaced at that point; or

(iii) removal of rock core or rock fragments from the wall of each emplacement hole at locations specified by designated personnel which lie within a distance, in meters, from each emplacement point of 30 times the cube root of the planned yield in kilotons of the explosive to be emplaced at each such point; or

(iv) construction of one or more new exploratory holes so that for each emplacement hole there will be a new exploratory hole to the same depth as that of the emplacement of the explosive, substantially parallel with and at no point more than 100 meters from each emplacement hole, from which rock cores would be removed at locations specified by designated personnal which lie within a distance, in meters, from the same horizon as each emplacement point of 30 times the cube root of the planned yield in kilotons of the explosive to be emplaced at each such point;

(c) observation of the emplacement of each explosive, confirmation of the depth of its emplacement and observation of the stemming of each emplacement hole;

(d) unobstructed visual observation of the area of the entrance to each emplacement hole at any time from the time of emplacement of each explosive until all personnel have been withdrawn from the site for the detonation of the explosion; and

(e) observation of each explosion.

3. Designated personnel, using equipment provided in accordance with paragraph 1 of Article IV, shall have the right, for any explosion with a planned aggregate yield exceeding 150 kilotons, to determine the yield of each individual explosion in a group explosion in accordance with the provisions of Article VI.

4. Designated personnel, when using their equipment in accordance with paragraph 1 of Article IV, shall have the right, for any explosion with a planned aggregate yield exceeding 500 kilotons, to emplace, install and operate under the observation and with the assistance of personnel of the Party carrying out the explosion, if such assistance is requested by designated personnel, a local seismic network in accordance with the provisions of paragraph 7 of Article IV. Radio links may be used for the transmission of data and control signals between the seismic stations and the control center. Frequencies, maximum power output of radio transmitters, directivity of antennas and times of operation of the local seismic network radio transmitters

before the explosion shall be agreed between the Parties in accordance with Article X and time of operation after the explosion shall conform to the time specified in paragraph 7 of Article IV.

5. Designated personnel shall have the right to:

(a) acquire photographs under the following conditions:

(1) the Party carrying out the explosion shall identify to the other Party those personnel of the Party carrying out the explosion who shall take photographs as requested by designated personnel;

(2) photographs shall be taken by personnel of the Party carrying out the explosion in the presence of designated personnel and at the time requested by designated personnel for taking such photographs. Designated personnel shall determine whether these photographs are in conformity with their requests and, if not, additional photographs shall be taken immediately;

(3) photographs shall be taken with cameras provided by the other Party having built-in, rapid developing capability and a copy of each photograph shall be provided at the completion of the development process to both Parties;

(4) cameras provided by designated personnel shall be kept in agreed secure storage when not in use; and

(5) the request for photographs can be made, at any time, of the following:

(i) exterior views of facilities and installations associated with the conduct of the explosion as described in subparagraph 4(a) of Article II;

(ii) geological samples used for confirmation of geological and geophysical information, as provided for in subparagraph 2(b) of this article and the equipment utilized in the acquisition of such samples;

(iii) emplacement and installation of equipment and associated cables used by designated personnel for yield determination;

(iv) emplacement and installation of the local seismic network used by designated personnel;

(v) emplacement of the explosives and the stemming of the emplacement hole; and

(vi) containers, facilities and installations for storage and operation of equipment used by designated personnel;

(b) photographs of visual displays and records produced by the equipment used by designated personnel and photographs within the control centers taken by cameras which are component parts of such equipment; and

(c) receive at the request of designated personnel and with the agreement of the Party carrying out the explosion supplementary photographs taken by the Party carrying out the explosion.

ARTICLE IV

1. Designated personnel in exercising their rights and functions may choose to use the following equipment of either Party, of which

choice the Party carrying out the explosion shall be informed not later than 150 days before the beginning of emplacement of the explosives:

(a) electrical equipment for yield determination and equipment for a local seismic network as described in paragraphs 3, 4 and 7 of this article; and

(b) geologist's field tools and kits and equipment for recording of field notes.

2. Designated personnel shall have the right in exercising their rights and functions to utilize the following additional equipment which shall be provided by the Party carrying out the explosion, under procedures to be established in accorance with Article X to ensure that the equipment meets the specifications of the other Party: portable short-range communication equipment, field glasses, optical equipment for surveying and other items which may be specified by the other Party. A description of such equipment and operating instructions shall be provided to the other Party not later than 90 days before the beginning of emplacement of the explosives in connection with which such equipment is to be used.

3. A complete set of electrical equipment for yield determination shall consist of:

(a) sensing elements and associated cables for transmission of electrical power, control signals and data;

(b) equipment of the control center, electrical power supplies and cables for transmission of electrical power, control signals and data; and

(c) measuring and calibration instruments, maintenance equipment and spare parts necessary for ensuring the functioning of sensing elements, cables and equipment of the control center.

4. A complete set of equipment for the local seismic network shall consist of:

(a) seismic stations each of which contains a seismic instrument, electrical power supply and associated cables and radio equipment for receiving and transmission of control signals and data or equipment for recording control signals and data;

(b) equipment of the control center and electrical power supplies; and

(c) measuring and calibration instruments, maintenance equipment and spare parts necessary for ensuring the functioning of the complete network.

5. In case designated personnel, in accordance with paragraph 1 of this article, choose to use equipment of the Party carrying out the explosion for yield determination or for a local seismic network, a description of such equipment and installation and operating instructions shall be provided to the other Party not later than 90 days before the beginning of emplacement of the explosives in connection with which such equipment is to be used. Personnel of the Party carrying out the explosion shall emplace, install and operate the equipment in the presence of designated personnel. After the explosion, designated personnel shall receive duplicate copies of the recorded data. Equipment for yield determination shall be emplaced in accordance with Article VI. Equipment for a local seismic network shall be emplaced in accordance with paragraph 7 of this article.

6. In case designated personnel, in accordance with paragraph 1 of this article, choose to use their own equipment for yield determination and their own equipment for a local seismic network, the following procedures shall apply:

(a) the Party carrying out the explosion shall be provided by the other Party with the equipment and information specified in subparagraphs (a)(1) and (a)(2) of this paragraph not later than 150 days prior to the beginning of emplacement of the explosives in connection with which such equipment is to be used in order to permit the Party carrying out the explosion to familarize itself with such equipment, if such equipment and information has not been previously provided, which equipment shall be returned to the other Party not later than 90 days before the beginning of emplacement of the explosives. The equipment and information to be provided are:

(1) one complete set of electrical equipment for yield determination as described in paragraph 3 of this article, electrical and mechanical design information, specifications and installation and operating instructions concerning this equipment; and

(2) one complete set of equipment for the local seismic network described in paragraph 4 of this article, including one seismic station, electrical and mechanical design information, specifications and installation and operating instructions concerning this equipment;

(b) not later than 35 days prior to the beginning of emplacement of the explosives in connection with which the following equipment is to be used, two complete sets of electrical equipment for yield determination as described in paragraph 3 of this article and specific installation instructions for the emplacement of the sensing elements based on information provided in accordance with subparagraph 2(a) of Article VI and two complete sets of equipment for the local seismic network as described in paragraph 4 of this article, which sets of equipment shall have the same components and technical characteristics as the corresponding equipment specified in subparagrh 6(a) of this article, shall be delivered in sealed containers to the port of entry;

(c) the Party carrying out the explosion shall choose one of each of the two sets of equipment described above which shall be used by designated personnel in connection with the explosion;

(d) the set or sets of equipment not chosen for use in connection with the explosion shall be at the disposal of the Party carrying out the explosion for a period that may be as long as 30 days after the explosion at which time such equipment shall be returned to the other Party;

(e) the set or sets of equipment chosen for use shall be transported by the Party carrying out the explosion in the sealed containers in which this equipment arrived, after seals of the Party carrying out the explosion have been affixed to them, to the site of the explosion, so that this equipment is delivered to designated personnel for emplacement, installation and operation not later than 20 days before the beginning of emplacement of the explosives. This equipment shall remain in the custody of designated personnel in accordance with paragraph 7 of Article V

or in agreed secure storage. Personnel of the Party carrying out the explosion shall have the right to observe the use of this equipment by designated personnel during the time the equipment is at the site of the explosion. Before the beginning of emplacement of the explosives, designated personnel shall demonstrate to personnel of the Party carrying out the explosion that this equipment is in working order;

(f) each set of equipment shall include two sets of components for recording data and associated calibration equipment. Both of these sets of components in the equipment chosen for use shall simultaneously record data. After the explosion, and after duplicate copies of all data have been obtained by designated personnel and the Party carrying out the explosion, one of each of the two sets of components for recording data and associated calibration equipment shall be selected, by an agreed process of chance, to be retained by designated personnel. Designated personnel shall pack and seal such components for recording data and associated calibration equipment which shall accompany them from the site of the explosion to the port of exit; and

(g) all remaining equipment may be retained by the Party carrying out the explosion for a period that may be as long as 30 days, after which time this equipment shall be returned to the other Party.

7. For any explosion with a planned aggregate yield exceeding 500 kilotons, a local seismic network, the number of stations of which shall be determined by designated personnel but shall not exceed the number of explosives in the group plus five, shall be emplaced, installed and operated at agreed sites of emplacement within an area circumscribed by circles of 15 kilometers in radius centered on points on the surface of the earth above the points of emplacement of the explosives during a period beginning not later than 20 days before the beginning of emplacement of the explosives and continuing after the explosion not later than three days unless otherwise agreed between the Parties.

8. The Party carrying out the explosion shall have the right to examine in the presence of designated personnel all equipment, instruments and tools of designated personnel specified in subparagraph 1(b) of this article.

9. The Joint Consultative Commission will consider proposals that either Party may put forward for the joint development of standardized equipment for verification purposes.

ARTICLE V

1. Except as limited by the provisions of paragraph 5 of this article designated personnel in the exercise of their rights and functions shall have access along agreed routes:

(a) for an explosion with a planned aggregate yield exceeding 100 kilotons in accordance with paragraph 2 of Article III:

(1) to the locations of facilities and installations associated with the conduct of the explosion provided in accordance with subparagraph 4(a) of Article II; and

(2) to the locations of activities described in paragraph 2 of Article III; and

(b) for any explosion with a planned aggregate yield exceeding 150 kilotons, in addition to the access described in subparagraph 1(a) of this article:

(1) to other locations within the area circumscribed by circles of 10 kilometers in radius centered on points on the surface of the earth above the points of emplacement of the explosives in order to confirm that the local circumstances are consistent with the stated peaceful purposes;

(2) to the locations of the components of the electrical equipment for yield determination to be used for recording data when, by agreement between the Parties, such equipment is located outside the area described in subparagraph 1(b)(1) of this article; and

(4) to the sites of emplacement of the equipment of the local seismic network provided for in paragraph 7 of Article IV.

2. The Party carrying out the explosion shall notify the other Party of the procedure it has chosen from among those specified in subparagraph 2(b)(3) of Article III not later than 30 days before beginning the implementation of such procedure. Designated personnel shall have the right to be present at the site of the explosion to exercise their rights and functions in the areas and at the locations described in paragraph 1 of this article for a period of time beginning two days before the beginning of the implementation of the procedure and continuing for a period of three days after the completion of this procedure.

3. Except as specified in paragraph 4 of this article, designated personnel shall have the right to be present in the areas and at the locations described in paragraph 1 of this article:

(a) for an explosion with a planned aggregate yield exceeding 100 kilotons but not exceeding 150 kilotons, in accordance with paragraph 2 of Article III, at any time beginning five days before the beginning of emplacement of the explosives and continuing after the explosion and after safe access to evacuated areas has been established according to standards determined by the Party carrying out the explosion for a period of two days; and

(b) for any explosion with a planned aggregate yield exceeding 150 kilotons, at any time beginning 20 days before the beginning of emplacement of the explosives and continuing after the explosion and after safe access to evacuated areas has been established according to standards determined by the Party carrying out the explosion for a period of:

(1) five days in the case of an explosion with a planned aggregate yield exceeding 150 kilotons but not exceeding 500 kilotons; or

(2) eight days in the case of an explosion with a planned aggregate yield exceeding 500 kilotons.

4. Designated personnel shall not have the right to be present in those areas from which all personnel have been evacuated in connection with carrying out an explosion, but shall have the right to reenter those areas at the same time as personnel of the Party carrying out the explosion.

5. Designated personnel shall not have or seek access by physical, visual or technical means to the interior of the canister containing an explosive, to documentary or other information descriptive of the

design of an explosive nor to equipment for control and firing of explosives. The Party carrying out the explosion shall not locate documentary or other information descriptive of the design of an explosive in such ways as to impede the designated personnel in the exercise of their rights and functions.

6. The number of designated personnel present at the site of an explosion shall not exceed:

(a) for the exercise of their rights and functions in connection with the confirmation of the geological and geophysical information in accordance with the provisions of subparagraph 2(b) and applicable provisions of paragraph 5 of Article III—the number of emplacement holes plus three;

(b) for the exercise of their rights and functions in connection with confirming that the local circumstances are consistent with the information provided and with the stated peaceful purposes in accordance with the provisions in subparagraphs 2(a), 2(c), 2(d) and 2(e) and applicable provisions of paragraph 5 of Article III—the number of explosives plus two;

(c) for the exercise of their rights and functions in connection with confirming that the local circumstances are consistent with the information provided and with the stated peaceful purposes in accordance with the provisions in subparagraphs 2(a), 2(c), 2(d) and 2(e) and applicable provisions of paragraph 5 of Article III and in connection with the use of electrical equipment for determination of the yield in accordance with paragraph 3 of Article III—the number of explosives plus seven; and

(d) for the exercise of their rights and functions in connection with confirming that the local circumstances are consistent with the information provided and with the stated peaceful purposes in accordance with the provisions in subparagraph 2(a), 2(c), 2(d) and 2(e) and applicable provisions of paragraph 5 of Article III and in connection with the use of electrical equipment for determination of the yield in accordance with paragraph 3 of Article III and with the use of the local seismic network in accordance with paragraph 4 of Article III—the number of explosives plus 10.

7. The Party carrying out the explosion shall have the right to assign its personnel to accompany designated personnel while the latter exercise their rights and functions.

8. The Party carrying out an explosion shall assure for designated personnel telecommunications with their authorities, transportation and other services appropriate to their presence and to the exercise of their rights and functions at the site of the explosion.

9. The expenses incurred for the transportation of designated personnel and their equipment to and from the site of the explosion, telecommunications provided for in paragraph 8 of this article, their living and working quarters, subsistence and all other personal expenses shall be the responsibility of the Party other than the Party carrying out the explosion.

10. Designated personnel shall consult with the Party carrying out the explosion in order to coordinate the planned program and schedule of activities of designated personnel with the program of the Party carrying out the explosion for the conduct of the project so as to ensure that designated personnel are able to conduct their activities

in an orderly and timely way that is compatible with the implementation of the project. Procedures for such consultations shall be established in accordance with Article X.

ARTICLE VI

For any explosion with a planned aggregate yield exceeding 150 kilotons, determination of the yield of each explosive used shall be carried out in accordance with the following provisions:

1. Determination of the yield of each individual explosion in the group shall be based on measurements of the velocity of propagation, as a function of time, of the hydrodynamic shock wave generated by the explosion, taken by means of electrical equipment described in paragraph 3 of Article IV.

2. The Party carrying out the explosion shall provide the other Party with the following information:

(a) not later than 60 days before the beginning of emplacement of the explosives, the length of each canister in which the explosive will be contained in the corresponding emplacement hole, the dimensions of the tube or other device used to emplace the canister and the cross-sectional dimensions of the emplacement hole to a distance, in meters, from the emplacement point of 10 times the cube root of its yield in kilotons;

(b) not later than 60 days before the beginning of emplacement of the explosives, a description of materials, including their densities, to be used to stem each emplacement hole; and

(c) not later than 30 days before the beginning of emplacement of the explosives, for each emplacement hole of a group explosion, the local coordinates of the point of emplacement of the explosive, the entrance of the emplacement hole, the point of the emplacement hole most distant from the entrance, the location of the emplacement hole at each 200 meters distance from the entrance and the configuration of any known voids larger than one cubic meter located within the distance, in meters, of 10 times the cube root of the planned yield in kilotons measured from the bottom of the canister containing the explosive. The error in these coordinates shall not exceed one percent of the distance between the emplacement hole and the nearest other emplacement hole or one percent of the distance between the point of measurement and the entrance of the emplacement hole, whichever is smaller, but in no case shall the error be required to be less than one meter.

3. The Party carrying out the explosion shall emplace for each explosive that portion of the electrical equipment for yield determination described in subparagraph 3(a) of Article IV, supplied in accordance with paragraph 1 of Article IV, in the same emplacement hole as the explosive in accordance with the installation instructions supplied under the provisions of paragraph 5 or 6 of Article IV. Such emplacement shall be carried out under the observation of designated personnel, Other equipment specified in subparagraph 3(b) of Article IV shall be emplaced and installed:

(a) by designated personnel under the observation and with the assistance of personnel of the Party carrying out the explosion, if such assistance is requested by designated personnel; or

(b) in accordance with paragraph 5 of Article IV.

4. That portion of the electrical equipment for yield determination described in subparagraph 3(a) of Article IV that is to be emplaced in each emplacement hole shall be located so that the end of the electrical equipment which is farthest from the entrance to the emplacement hole is at a distance, in meters, from the bottom of the canister containing the explosive equal to 3.5 times the cube root of the planned yield in kilotons of the explosive when the planned yield is less than 20 kilotons and three times the cube root of the planned yield in kilotons of the explosive when the planned yield is 20 kilotons or more. Canisters longer than 10 meters containing the explosive shall only be utilized if there is prior agreement between the Parties establishing provisions for their use. The Party carrying out the explosion shall provide the other Party with data on the distribution of density inside any other canister in the emplacement hole with a transverse cross-sectional area exceeding 10 square centimeters located within a distance, in meters, of 10 times the cube root of the planned yield in kilotons of the explosion from the bottom of the canister containing the explosive. The Party carrying out the explosion shall provide the other Party with access to confirm such data on density distribution within any such canister.

5. The Party carrying out an explosion shall fill each emplacement hole, including all pipes and tubes contained therein which have at any transverse section an aggregate cross-sectional area exceeding 10 square centimeters in the region containing the electrical equipment for yield determination and to a distance, in meters, of six times the cube root of the planned yield in kilotons of the explosive from the explosive emplacement point, with material having a density not less than seven-tenths of the average density of the surrounding rock, and from that point to a distance of not less than 60 meters from the explosive emplacement point with material having a density greater than one gram per cubic centimeter.

6. Designated personnel shall have the right to:

(a) confirm information provided in accordance with subparagraph 2(a) of this article;

(b) confirm information provided in accordance with subparagraph 2(b) of this article and be provided, upon request, with a sample of each batch of stemming material as that material is put into the emplacement hole; and

(c) confirm the information provided in accordance with subparagraph 2(c) of this article by having access to the data acquired and by observing, upon their request, the making of measurements.

7. For those explosives which are emplaced in separate emplacement holes, the emplacement shall be such that the distance D, in meters, between any explosive and any portion of the electrical equipment for determination of the yield of any other explosive in the group shall be not less than 10 times the cube root of the planned yield in kilotons of the larger explosive of such a pair of explosives. Individual explosions shall be separated by time intervals, in milliseconds, not greater than one-sixth the amount by which the distance D, meters, exceeds 10 times the cube root of the planned yield in kilotons of the larger explosive of such a pair of explosives.

8. For those explosives in a group which are emplaced in a common emplacement hole, the distance, in meters, between each explosive

and any other explosive in that emplacement hole shall be not less than 10 times the cube root of the planned yield in kilotons of the larger explosive of such a pair of explosives, and the explosives shall be detonated in sequential order, beginning with the explosive farthest from the entrance to the emplacement hole, with the individual detonations separated by time intervals, in milliseconds, of not less than one times the cube root of the planned yield in kilotons of the largest explosive in this emplacement hole.

ARTICLE VII

1. Designated personnel with their personal baggage and their equipment as provided in Article IV shall be permitted to enter the territory of the Party carrying out the explosion at an entry port to be agreed upon by the Parties, to remain in the territory of the Party carrying out the explosion for the purpose of fulfilling their rights and functions provided for in the Treaty and this Protocol, and to depart from an exit port to be agreed upon by the Parties.

2. At all times while designated personnel are in the territory of the Party carrying out the explosion, their persons, property, personal baggage, archives and documents as well as their temporary official and living quarters shall be accorded the same privileges and immunities as provided in Articles 22, 23, 24, 29, 30, 31, 34 and 36 of the Vienna Convention on Diplomatic Relations of 1961 to the persons, property, personal baggage, archives and documents of diplomatic agents as well as to the premises of diplomatic missions and private residences of diplomatic agents.

3. Without prejudice to their privileges and immunities it shall be the duty of designated personnel to respect the laws and regulations of the State in whose territory the explosion is to be carried out insofar as they do not impede in any way whatsoever the proper exercising of their rights and functions provided for by the Treaty and this Protocol.

ARTICLE VIII

The Party carrying out an explosion shall have sole and exclusive control over and full responsibility for the conduct of the explosion.

ARTICLE IX

1. Nothing in the Treaty and this Protocol shall affect proprietary rights in information made available under the Treaty and this Protocol and in information which may be disclosed in preparation for and carrying out of explosions; however, claims to such proprietary rights shall not impede implementation of the provisions of the Treaty and this Protocol.

2. Public release of the information provided in accordance with Article II or publication of material using such information, as well as public release of the results of observation and measurements obtained by designated personnel, may take place only by agreement with the Party carrying out an explosion; however, the other Party shall have the right to issue statements after the explosion that do not divulge information in which the Party carrying out the explosion has rights which are referred to in paragraph 1 of this article.

ARTICLE X

The Joint Consultative Commission shall establish procedures through which the Parties will, as appropriate, consult with each other for the purpose of ensuring efficient implementation of this Protocol.

Done at Washington and Moscow, on May 28, 1976.

For the United States of America:

GERALD R. FORD,
The President of the United States of America.

For the Union of Soviet Socialist Republics:

L. I. BREZHNEV,
General Secretary of the Central Committee of the CPSU.

AGREED STATEMENT

The Parties to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, hereinafter referred to as the Treaty, agree that under subparagraph 2(c) of Article III of the Treaty:

(a) Development testing of nuclear explosives does not constitute a "peaceful application" and any such development tests shall be carried out only within the boundaries of nulcear weapon test sites specified in accordance with the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests;

(b) Associating test facilities, instrumentation or procedures related only to testing of nuclear weapons or their effects with any explosion carried out in accordance with the Treaty does not constitute a "peaceful application."

MAY 13, 1976.

Appendix C–4

Office of the White House Press Secretary,
Vladivostok, U.S.S.R., November 24, 1974.

Joint United States-Soviet Communique

In accordance with the previously announced agreement, a working meeting between the President of the United States of America Gerald R. Ford and the General Secretary of the Central Committee of the Communist Party of the Soviet Union L. I. Brezhnev took place in the area of Vladivostok on November 23 and 24, 1974. Taking part in the talks were the Secretary of State of the United States of America and Assistant to the President for National Security Affairs, Henry A. Kissinger and Member of the Politburo of the Central Committee of the CPSU, Minister of Foreign Affairs of the U.S.S.R., A. A. Gromyko.

They discussed a broad range of questions dealing with American-Soviet relations and the current international situation.

Also taking part in the talks were:

On the American side Walter J. Stoessel, Jr., Ambassador of the U.S.A. to the U.S.S.R.; Helmut Sonnenfeldt, Counselor of the Department of State; Arthur A. Hartman, Assistant Secretary of State for European Affairs; Lieutenant General Brent Scowcroft, Deputy Assistant to the President for National Security Affairs; and William Hyland, official of the Department of State.

On the Soviet side A. F. Dobrynin, Ambassador of the U.S.S.R. to the U.S.A.; A. M. Aleksandrov, Assistant to the General Secretary of the Central Committee of the CPSU; and G. M. Korniyenko, Member of the Collegium of the Ministry of Foreign Affairs of the U.S.S.R.

I

The United States of America and the Soviet Union reaffirmed their determination to develop further their relations in the direction defined by the fundamental joint decisions and basic treaties and agreements concluded between the two States in recent years.

They are convinced that the course of American-Soviet relations, directed towards strengthening world peace, deepening the relaxation of international tensions and expanding mutually beneficial cooperation of states with different social systems meets the vital interests of the peoples of both States and other peoples.

Both Sides consider that based on the agreements reached between them important results have been achieved in fundamentally reshaping American-Soviet relations on the basis of peaceful coexistance and equal security. These results are a solid foundation for progress in reshaping Soviet-American relations.

Accordingly, they intend to continue, without a loss in momentum, to expand the scale and intensity of their cooperative efforts in all spheres as set forth in the agreements they have signed so that the process of improving relations between the U.S. and the U.S.S.R. will continue without interruption and will become irreversible.

Mutual determination was expressed to carry out strictly and fully the mutual obligations undertaken by the U.S. and the U.S.S.R. in accordance with the treaties and agreements concluded between them.

II

Special consideration was given in the course of the talks to a pivotal aspect of Soviet-American relations; measures to eliminate the threat of war and to halt the arms race.

Both sides reaffirm that the Agreements reached between the U.S. and the U.S.S.R. on the prevention of nuclear war and the limitation of strategic arms are a good beginning in the process of creating guarantees against the outbreak of nuclear conflict and war in general. They expressed their deep belief in the necessity of promoting this process and expressed their hope that other states would contribute to it as well. For their part the U.S. and the U.S.S.R. will continue to exert vigorous efforts to achieve this historic task.

A joint statement on the question of limiting strategic offensive arms is being released separately.

Both sides stressed once again the importance and necessity of a serious effort aimed at preventing the dangers connected with the spread of nuclear weapons in the world. In this connection they stressed the importance of increasing the effectiveness of the Treaty on the Non-Proliferation of Nuclear Weapons.

It was noted that, in accordance with previous agreements, initial contracts were established between representatives of the U.S. and of the U.S.S.R. on questions related to underground nuclear explosions for peaceful purposes, to measures to overcome the dangers of the use of environmental modification techniques for military purposes, as well as measures dealing with the most dangerous lethal means of chemical warfare. It was agreed to continue an active search for mutually acceptable solutions of these questions.

Having reviewed the situation at the Conference on Security and Cooperation in Europe, both Sides concluded that there is a possibility for its early successful conclusion. They proceed from the assumption that the results achieved in the course of the Conference will permit its conclusion at the highest level and thus be commensurate with its importance in ensuring the peaceful future of Europe.

The U.S.A. and the U.S.S.R. also attach high importance to the negotiations on mutual reduction of forces and armaments and associated measures in Central Europe. They agree to contribute actively to the search for mutually acceptable solutions on the basis of principle of undiminished securty for any of the parties and the prevention of unilateral military advantages.

Having discussed the situation existing in the Eastern Mediterranean, both Sides state their firm support for the independence, sovereignty and territorial integrity of Cyprus and will make every effort in this direction. They consider that a just settlement of the Cyprus question must be based on the strict implementation of the

resolutions adopted by the Security Council and the General Assembly of the United Nations regarding Cyprus.

In the course of the exchange of views on the Middle East both Sides expressed their concern with regard to the dangerous situation in that region. They reaffirmed their intention to make every effort to promote a solution of the key issues of a just and lasting peace in that area on the basis of the United Nations resolution 338.

The Sides believe that the Geneva Conference should play an important part in the establishment of a just and lasting peace in the Middle East, and should resume its work as soon as possible.

The state of relations was reviewed in the field of commercial, economic, scientific and technical ties between the U.S.A. and the U.S.S.R. Both Sides confirmed the great importance which further progress in these fields would have for Soviet-American relations, and expressed their firm intention to continue the broadening and deepening of mutually advantageous cooperation.

The two Sides emphasized the special importance accorded by them to the development on a long term basis of commercial and economic cooperation, including mutually beneficial large-scale projects. They believe that such commercial and economic cooperation will serve the cause of increasing the stability of Soviet-American relations.

Both Sides noted with satisfaction the progress in the implementation of agreements and in the development of ties and cooperation between the U.S. and U.S.S.R. in the fields of science, technology and culture. They are convinced that the continued expansion of such cooperation will benefit the people of both countries and will be an important contribution to the solution of world-wide scientific and technical problems.

The talks were held in an atmosphere of frankness and mutual understanding, reflecting the constructive desire of both Sides to strengthen and develop further the peaceful cooperative relationship between the U.S.A. and the U.S.S.R., and to ensure progress in the solution of outstanding international problems in the interests of preserving and strengthening peace.

The results of the talks provided a convincing demonstration of the practical value of Soviet-American summit meetings and their exceptional importance in the shaping of a new relationship between the United States of America and the Soviet Union.

President Ford reaffirmed the invitation to L. I. Brezhnev to pay an official visit to the United States in 1975. The exact date of the visit will be agreed upon later.

For the United States of America:

GERALD R. FORD,
President of the
United States of America.

For the Union of Soviet Socialist Republics:

L. I. BREZHNEV,
General Secretary of the
Central Committee of the CPSU.

NOVEMBER 24, 1974.

Appendix C–5

Statement by Senator James L. Buckley, in the U.S. Senate, concerning "Salt Talks", December 18, 1975

[Excerpted from the Congressional Record, Dec. 18, 1975, p. S22707]

Mr. President, since November of 1974 the United States has been engaged in an effort to negotiate firm language which would implement the agreement reached between Secretary Brezhnev and President Ford at their summit meeting at Vladivostok. To date, this effort has been unsuccessful. In the meantime, based upon reports from various sources, we appear to be yielding ground to a dangerous degree while the Soviets continue to disregard critical terms of the existing accords.

The first area of concern relates to our negotiating position with respect to the limitation of strategic arms. I would like to summarize some of my major worries because I fear that an unnecessary and divisive debate may result from the one-sided terms the administration appears willing to propose to the Soviet Union. I would like to be specific in this regard.

First, the United States is willing to permit the lopsided silo limitations of the first round SALT accords to carry over into SALT II. This means that the Soviet Union will be permitted not only to deploy 50 percent more ICBM silos than the United States, but because the Soviets are allowed significantly larger missiles than the United States, their total missile payload advantage will be even more lopsided than they had at the time the SALT accords were ratified in 1972. If the Soviet Union continues to replace its SS–9's and SS–18's and its SS–11's with SS–17's or SS–19's, and the Congress does not provide funds for a new land-based ICBM replacement for the Minuteman missile to offset a part of this growth, the Soviet Union will have a land-based missile payload capacity of 11.7 million pounds to only 1.1 million pounds for the United States. If Soviet engineers and scientists are merely able to match the 1965 vintage warhead design which the United States now deploys, the Soviet Union could translate this payload advantage into 10 times as many warheads as the United States. This clearly is not what the Congress intended when it appended the Jackson amendment to the ratification of the 1972 SALT accords, which called for essential parity in a future agreement. Thus, the first priority of our SALT negotiators should be to correct this imbalance. Unfortunately, our negotiators appear willing to retreat from this essential prerequisite.

Second, I am concerned that the U.S. position on the issue of the Backfire bomber has collapsed. Engineering analysis of the capabilities of the new Soviet bomber and its new air-to-surface missile, the AS–6,

clearly indicates that it has the capability to reach all important targets in the United States. Until recently, this had also been the position of the U.S. Government, and in my view, we properly have refused to accept the Soviet position that the Backfire is an aircraft solely designed for the Eurasian landmass, and not for intercontinental attack. Unfortunately, in the face of Soviet intransigence, we are about to advance a proposal that essentially reverses our earlier position. Rather than require that the Backfire be counted among Soviet strategic nuclear delivery systems under SALT II, we are now ready to propose that the Backfire be counted only if it is based on the network of Arctic staging bases on the northern rim of the Soviet Union closest to the North American continent.

This is the most transparent coverup of the collapse of our negotiating position. Backfire bombers, normally deployed in the Soviet interior, can, of course, be deployed at these bases on very short notice. There can be no agreement acceptable to the Congress which does not classify the Backfire as an intercontinental bomber.

Third, our position on the cruise missile is one which reflects an undue zeal to reach an agreement without regard to the consequences for the long-term security needs of the United States, The cruise missile is one of the most important additions made in recent years to our defense capability. Because of the great flexibility of deployment of the cruise missile, and modern guidance technology, cruise missiles armed with conventional or nuclear warheads may be able to replace nuclear weapons in many military applications. Yet the United States is prepared to adopt constraints which would have the effect of eliminating the U.S. strategic cruise missile program while permitting the Soviets to maintain their deployment of more than 2,000 cruise missiles, and provide an incentive for them to deploy more. By proposing limitations on cruise missiles with respect to range or payload of the missile, the United States is constrained because of the fact that we must deploy a cruise missile with a range in excess of 1,500 nautical miles if it is to be able to penetrate Soviet air defenses to reach Soviet targets which are far inland. By way of contrast, however, most major U.S. targets are located in coastal areas readily accessible to shorter range submarine-launched cruise missiles.

The Soviet Union already has a large number of cruise missiles which are classified as having a range of under 1,500 miles based on low altitude flight profiles. But if they are flown at their most efficient flying altitude, they can have a range which is as much as six times their range at low altitudes. Thus, a Soviet cruise missile, which is classified as having a range of 1,500 miles, could, because of the total lack of serious air defense in the United States, be launched from distances of 6,000 miles. Stated differently, the agreement which we are proposing on cruise missiles is simply unverifiable by any means known to man. We are better off without any cruise missile limitation than one which cannot be verified.

Finally, there is the issue of the failure of the Soviet Union to comply with the terms of the first round SALT accords. More than a year has elapsed since I raised the issue of Soviet noncompliance with the SALT accords. The revelations this week by the House

Select Committee on Intelligence Operations has added further confirmation to that which was already widely known in the intelligence community; namely, that the Soviets have violated major portions of the first round accords to the point where it is clear that any future agreement must be fully verifiable. No reliance whatever can be placed on Soviet good faith. Let me briefly review a few of the violations:

First. They have attempted to prevent verification of their compliance with the terms of the SALT I accords through concealment, camouflage, clandestine experimentations, and other techniques, all in violation of article XII of the ABM Treaty.

Second. They have deployed a new generation of ICBM's which are approximately 50 percent larger than permitted under the definition of "light" missiles provided the Senate during hearings on the SALT accords.

Third. They have conducted a clandestine program to upgrade their air defense system to an ABM system. They now have in place the SA–5 system consisting of high-powered transportable radars and 1,100 launchers, each with 6 reloads, which has benefited from more than 60 illegal ABM experiments.

Fourth. Important details about the Soviet submarine construction program is now being concealed so that we may not be able to reliably determine, among other things, whether or not the Soviet submarine is being equipped with multiple warhead missiles.

I recognize, Mr. President, that there are those who maintain that these violations are not really violations, because the language of the SALT I accords can be twisted and stretched to accommodate just about anything the Soviets have chosen to do. The fact is, however, that they plainly violate the interpretation placed upon the agreements by their American negotiators at the time they were ratified by the Senate. They violate the accords as interpreted for us. They clearly breach the spirit of the agreements in their most important aspects. I do not see how any other face can be placed on the matter.

What deeply concerns me is that we may have learned little from this experience. This is why I think it is vitally important, Mr. President, that the President be put on notice that the Senate will not ratify another SALT agreement without asking all the hard questions, and insisting on full disclosure of every collateral understanding. Above all else, we must avoid self-imposed deadlines that will serve to rush us into another ill-conceived agreement that will serve to consolidate the enormous advantages the Soviets achieved through SALT I. Above all, we must think through our strategic posture, and determine how best to achieve the goal of essential strategic parity on a fully verifiable basis. Anything short of this could prove suicidal.

Appendix C–6

Statement by Representative George E. Brown, Jr., concerning "Andrei Sakharov: A Humanitarian and a Radical," October 30, 1975

[Excerpted from the Congressional Record, Oct. 30, 1975, p. E5700]

Mr. Speaker, the 1975 Nobel Peace Prize went to a man who is much deserving of that honor. Other recipients in other years have made similar contributions to the cause of world peace, with similar domestic responses. Dr. Sakharov has suffered the condemnation of his fellow countrymen, and has been labeled a "radical." I believe that his views truly are "radical," in the finest sense of that word. Like Dr. Martin Luther King and Dr. Linus Pauling, two American recipients of the Nobel Peace Prize, Dr. Sakharov holds views that are not those of the people in power.

A small sample of this great man's thought was published recently in the Los Angeles Times, and deserve the thoughtful review of every Member of this body. In remarks prepared for the 1975 Pugwash Conference on the important subject of disarmament, of both nuclear and conventional weapons. No subject is more important to world peace prospects, and for this reason I insert this brave man's views in the Congressional Record at this time.

The article follows:

[From the Los Angeles Times, Oct. 27, 1975]

Soviet Physicist Urges "Full" Disarming: All Nuclear Weapons Should Be Prohibited, Says 1975 Nobel Peace Laureate

(By Andrei D. Sakharov)

Andrei D. Sakharov is the distinguished Russian physicist and winner of the 1975 Nobel Peace Prize. He wrote the following statement for a symposium on "New Designs for Complete Nuclear Disarmament," held in Kyoto, Japan ,in late August under auspices of the Pugwash Conference. Known as "the father of the Soviet H-bomb," he is now an activist in the dissident community. Because Sakharov could not attend the symposium, his message was read by a friend, Frantisek Janouch, a Czech physicist now working in exile in Sweden, who made this translation. Previously unpublished, the statement was provided to The Times by Herbert York, a physicist at the University of San Diego at La Jolia, and appears in the current Bulletin of Atomic Scientists (The Pugwash Conference is an international group concerned with the nuclear threat, and takes its name from the site of its first meeting at Pugwash, Nova Scotia).

The tragedy that, 30 years ago, befell Hiroshima and Nagasaki has been distressing me throughout my life both as an atomic physicist and as simply a man of planet, earth, which could be entirely reduced to such heaps of horrible ruins if reason and goodness do not prevail over a mutual distrust, fear, greed and hatred.

None believe, I think, that the cause of the catastrophe hanging over mankind lies in the great scientific discoveries of the 20th century or in some demoniac qualities of human nature. We all are, on the contrary, convinced that science has now brought about the possibility of an abundance in the world which was totally

unattainable a hundred years ago. We know, too, that man, with all his advantages and drawbacks, is still the same as in the time of Aeschylus and the biblical prophets, no matter whether he be white, black or yellow; capitalist, worker or scientist; believer or atheist; socialist or one of those whom some call reactionary.

I do not intend to analyze here the complicated reasons for the rise of the present critical world situation. I have tried to explain my point of view, subjective and arguable as it may be, in a book now appearing in the West: "On My Country and the World." Yet I would like to attempt to reiterate briefly some of the thoughts contained therein.

The problems of disarmament have an evident priority over other problems confronting mankind now; but they cannot be solved without strengthening international confidence, without overcoming the closed attitude of the socialist countries; nor can they be solved in isolation from other aspects of detente.

The most important aim of detente must be the total prohibition of nuclear weaponry and 'full disarmament. This aim can be reached only gradually. At each stage of this process it is necessary to achieve the reduction of armament to an equal level:

Equal overall strengths of thermonuclear military equipment of the Soviet Union and the United States, to be achieved through negotiations on the limitation of strategic weapons.

An equal number of tanks and divisions of NATO and the Warsaw Pact countries, to be achieved through European disarmament negotiations.

An equality of the armed forces of the Soviet Union and the Chinese People's Republic concentrated along the common frontier.

The realization of complete international control of armaments is of fundamental importance. This is one of those questions on which the Soviet Union and the other socialist states have taken a particularly unyielding and unconstructive urgency. It is necessary to bring about the creation of international inspection teams with the right to free access to all regions of the inspected country. There exist already some precedents of this kind.

It is indispensable to get rid of, once and for all, spy mainia. Notions like "military secret," "secret work," or "publication suppressed for reasons of secrecy," should not exist in the world of the future. Obviously, the transition to such an *open world* (Neils Bohr's expression) will be gradual.

One of the first steps in that direction should be the realization of Clauses 13 and 19 of the United Nations General Declaration of Human Rights; that is, a free exchange of people and information on the basis of legislative acts—free travel of people from one country to another, a free choice of the country of residence (and, of course, a free choice of residence inside a country!), a free reception of broadcast and televised programs, a free international book market. All this is directly related to international trust and thus to international security.

It is important to find solutions as quickly as possible to the particular problems of disarmament—to agree to discontinue the development of exceptionally dangerous new types of weapons, to agree on the prohibition of strategic rockets with thermonuclear, multiple independently targetable warheads; to agree on the limitation of the production of antirocket weapons; and to agree on the diminution of other activities leading to strategic instability.

Of great importance for international security would be, I believe, the prohibition of arms deliveries from countries with highly developed armaments industries to developing countries, and particularly to countries where armed conflicts are either in progress or are imminent. Such a prohibition would not only have considerable humanitarian importance but would also serve to increase world stability, since it is observable that at the present time arms deliveries are one of the primary means by which the great powers are struggling to extend their spheres of influence. And, as far as the developing countries themselves are concerned, such a solution would assist peaceful economic development rather than militarization.

For many years, and with the same sustained attention, I have been following the work of the Pugwash Conference on the basis of the scanty data being published in the Soviet Union or obtained through unofficial channels. Unfortunately, one has the impression that the conferences are often no more than a way of unofficially sounding out government positions, and that they have little practical success in enabling the community (including the scientific community) to influence governments on matters so vital to all mankind.

I hope that further Pugwash conferences will succeed in exerting a greater influence on world public opinion, and thus on the policies of government decision-makers.

APPENDIX D

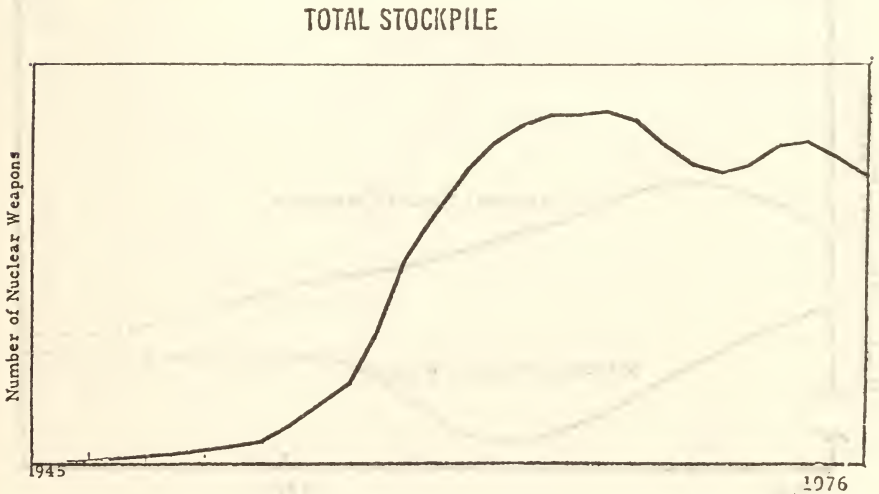
Strategic Deterrence

Appendix D–1

Trends in the U.S. Nuclear Weapons Stockpile

[Provided by the Assistant to the Secretary of Defense (Atomic Energy) February 1976]

A review of the history of the U.S. stockpile shows (see chart) a build-up in nuclear weapons in the late 50's and early 60's to meet national objectives for nuclear strategic and theater forces.



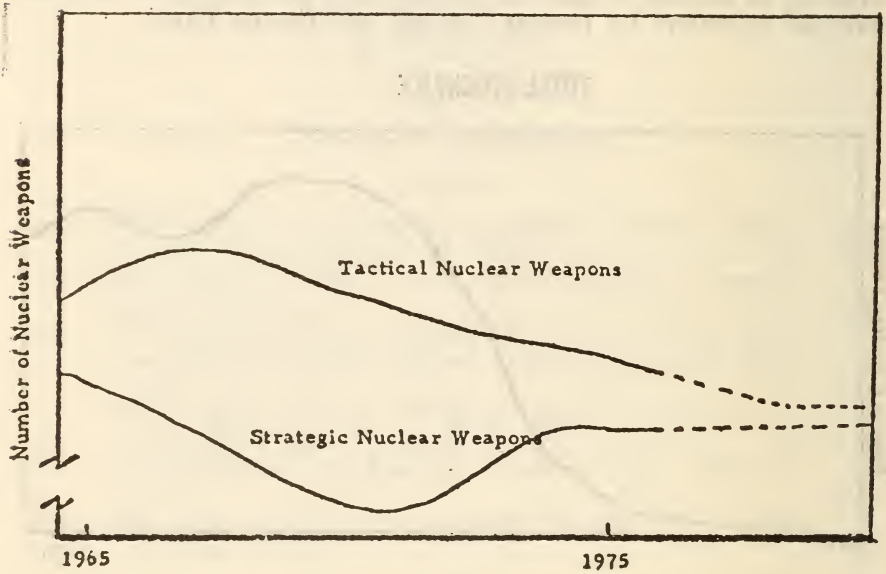
The stockpile leveled off in the sixties and shortly thereafter, it took a general downward trend as strategic missile forces started to replace a portion of the inventory of strategic aircraft and their bombs. The slight increase in the stockpile in the 1971–73 time frame reflects the introduction of MIRVs in the Poseidon and portions of the Minuteman force. The second decrease, from 1973 to the present reflects:—Retirements of CONUS air defense weapons;—retirements of some obsolete tactical weapons being replaced by new conventional weapons and modernized nuclear weapons.

Examples of modernization are the introduction of more capable gravity bombs to replace a larger number of fixed yield bombs; the replacement of tactical Honest John and Sergeant missiles by the Lance missile which has greater range, mobility and yield flexibility, enabling it to engage the required number of targets with a lesser number of deployed weapons. Thus, although the replacements are

on a less than one-for-one basis in some cases, this actually represents greater capabilities for the overall inventory of tactical nuclear weapons. Therefore, our projection for the next five years is that the number of new weapons to be built will be less than the number of weapons retired.

This next chart illustrates the mix in tactical and strategic weapons and shows that there will be essentially equal numbers in the mix. U.S. planning envisions keeping these levels relatively flat over the next several years. However, this will depend on the success or failure of Arms Control arrangements we are pursuing with the Soviets.

STOCKPILE MIX OF US WEAPONS



The general trend in U.S. strategic weapons has been to reduce the megatonnage. The decrease was the result of several factors. First, the U.S. made a deliberate decision to develop the capability to deliver multiple instead of single warheads on each strategic missile. This required a trade-off between the large yield of a single warhead with that of several smaller yield warheads whose combined yield was less . . . yet their overall damage capability was greater.

Second, as the U.S. ICBM and SLBM missile forces evolved into a highly reliable, survivable, almost 100% around the clock alert capability, we required less bombers with their larger yield bombs for our overall strategic capability. Even through the total megatonnage was reduced, the combined effectiveness was increased.

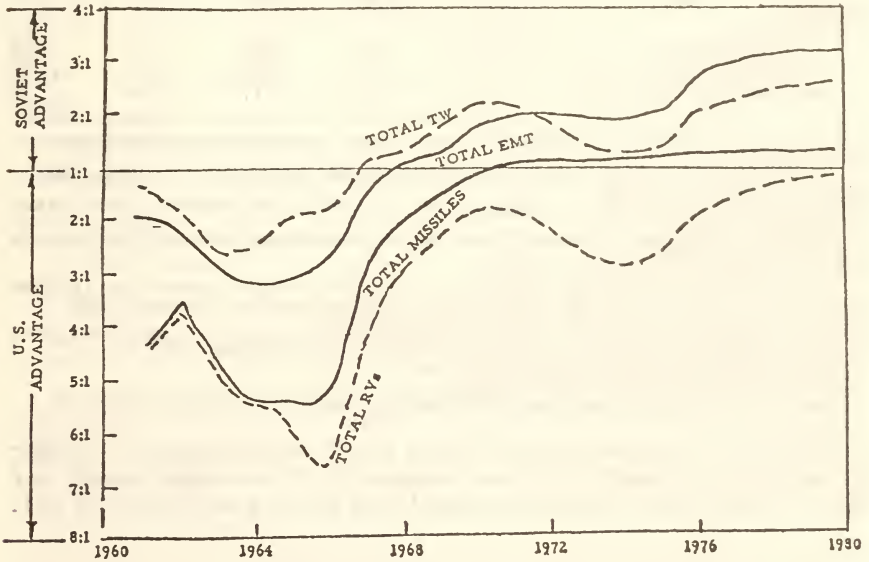
Third, the ICBMs and SLBMs became even more effective as improved guidance systems made possible more accurate delivery of each multiple reentry vehicle on its intended target. As accuracy capabilities i mproved, it became possible to use smaller yield weapons on ballistic missiles, further allowing a reduction in required overall megatonnage.

Thus, a large number of multi-megaton bombs and missile warheads have been retired and replaced by more effective multiple payloads.

We believe this was a proper decision since, measured in terms of effective megatonnage (or area coverage) multiple payloads have given us an improvement in target coverage effectiveness while still maintaining a lesser number of aircraft or missile launchers. This advantage is some compensation for the large Soviet throw-weight.

This next chart depicts the history and projection of the U.S./Soviet strategic missile comparison.

U.S./U.S.S.R. Strategic Missile Advantage



The acquisition of a more capable nuclear missile force (MIRVs plus accuracy) by the U.S.S.R. could have especially profound and negative effects on U.S. security. The Soviets continue to develop and deploy four powerful ICBMs. They will have far surpassed the US strategic forces in throw-weight capability.

A comparison of the U.S. and Soviet force levels, mid-1975 and projected through mid-1976 is shown on the next chart.

UNITED STATES AND U.S.S.R. STRATEGIC FORCE LEVELS

	Mid-1975		Mid-1976	
	United States	U.S.S.R.	United States	U.S.S.R.
Offensive:				
ICBM launchers: [1] [2]				
Operational	1,054	1,600	1,054	1,500
Others	0	0	0	0
SLBM launchers:				
Operational [1] [2]	656	730	656	850
Others [3]	0	0	0	0
Long-range bombers: [4]				
Operational [5]	497	160	421	180
Others [6]	112	170	[7] 184	175
Force loadings: [8] Weapons	8,500	2,500	8,900	3,500
Defensive: [9]				
Air defense:				
Surveillance radars	59	4,500	61	5,500
Interceptors [10]	412	2,600	315	2,600
SAM launchers [11]		10,000		10,000
ABM defense: Launchers	36	64	100	64

[1] Includes online missile launchers as well as those in the final stages of construction, in overhaul, repair, conversion, and modernization.
[2] Does not include test and training launchers, but, for the U.S.S.R., does include launchers at test ranges which are probably part of the operational force.
[3] Includes launchers on all nuclear-powered submarines and, for the Soviets, operational launchers for modern SLBM's on G-class diesel submarines.
[4] The following long-range bombers are placed in this category: for the United States: B–52's, FB–111, and B–1; for the U.S.S.R.: Bear, Bison, Backfire.
[5] Includes deployed, strike-configured aircraft only.
[6] For the United States, includes bombers for R.D.T. & E. and in reserve, mothballs, and storage. For the U.S.S.R., includes all variants of Bear, Bison, and Backfire (tankers, ASW, trainers, reconnaissance, etc.) wherever located.
[7] Represents the maximum number of aircraft assuming no cannibalization.
[8] Total force loadings reflect only those independently-targetable weapons associated with online ICBM's/SLBM's and UE aircraft. Weapons reserved for restrike and weapons on inactive status are not included.
[9] Excludes radars and launchers at test sites or outside CONUS.
[10] These numbers represent total active inventory (TAI).
[11] These 10,000 launchers accommodate about 12,000 SAM interceptors. Some of the launchers have multiple rails.

While you can see that we possess about three times the number of warheads as the Soviets, we estimate that the megatonnage for the strategic force levels favors the U.S.S.R. by a ratio of over 3 to 1.

Appendix D–2

U.S. AND U.S.S.R. STRATEGIC FORCE LEVELS

	Mid-1975		Mid-1976	
	United States	U.S.S.R.	United States	U.S.S.R.
Offensive:				
ICBM launchers:				
Operational [1] [2]	1,054	1,600	1,054	1,500
Others	0	0	0	0
SLBM launchers:				
Operational [1] [2]	656	730	656	850
Others	0	0	0	0
Long-range bombers: [4]				
Operational [5]	497	160	421	180
Others [6]	112	170	[7] 184	175
Force loading: [8] Weapons	8,500	2,500	8,900	3,500
Defense: [9]				
Air defense:				
Surveillance radars	59	4,500	61	5,500
Interceptors [10]	412	2,600	315	2,600
SAM launchers [11]		10,000		10,000
AMB defense launchers	36	64	100	64

[1] Includes online missile launchers as well as those in the final stages of construction, in overhaul, repair, conversion, and modernization.

[2] Does not include test and training launchers, but, for the U.S.S.R., does include launchers at test ranges which are probably part of the operational force.

[3] Includes launchers on all nuclear-powered submarines and, for the Soviets, operational launchers for modern SLBM's on G-class diesel submarines.

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[7] Represents the maximum number of aircraft assuming no cannibalization.

[8] Total force loadings reflect only those independently-targetable weapons associated with online ICBM's/SLBM's and UE aircraft. Weapons reserved for restrike and weapons on inactive status are not included.

[9] Excludes radars and launchers at test sites or outside CONUS.

[10] These numbers represent total active inventory (TAI).

[11] These 10,000 launchers accommodate about 12,000 SAM interceptors. Some of the launchers have multiple rails.

Source: "Annual Defense Department Report, fiscal year 1977", p. 54.

73-642—76——10

Appendix D–3

ACQUISITION COSTS OF MAJOR STRATEGIC FORCES MODERNIZATION AND IMPROVEMENT PROGRAMS [1]

	Fiscal year 1975 actual funding	Fiscal year 1976 planned funding	Transition period planned funding	Fiscal year 1977 proposed funding	Fiscal year 1978 proposed for authorization
Strategic offense:					
Minuteman and improvements (silo upgrade, command data buffer, MK12A warhead, NS–20 guidance refinements)	$728	$804	$105	$472	$317
Advanced ICBM technology, including MX	37	36	13	84	184
Development of advanced ballistic reentry systems and technology (ABRES)	110	91	24	106	117
Conversion of SSBNs to Poseidon configuration, modification of Poseidon missiles	179	84	18	51	29
Acquisition of Trident military submarines and missiles (Trident II not included in total)	2,029	1,925	606	2,933	3,383
Development of Trident II missile				3	21
SSBN subsystem technology development				2	5
Acquisition of new strategic bomber, B–1	445	661	152	1,532	1,868
Development of the air launched and submarne launched version of the strategic cruise missile	96	144	50	262	362
Development and procurement of the joint surveillance system	4	8	8	32	51
Continued development of the over-the-horizon (OTH) back-scatter radar	7	8	7	19	9
Development of systems technology (formerly site defense)	117	100	25	118	129
Development of ballistic missile defense advanced technology	95	97	25	107	112
Continued improvements in the defense support program	122	71	9	57	154
Modernization of BMEWS (ballistic missile early warning system)				4	20
Development and acquisition of the SLBM phased array radar warning system	42	47	2	14	6
Acquisition of improved space surveillance system	19	13	4	43	72
Command and control:					
Development and procurement of advanced airborne command post (AABNCP)	63	42	8	99	62
Development and procurement of satellite communications (AFSATCOM I and II)	12	44	5	39	66
Development of ELF communications system	8	15	4	30	17
Acquisition and modification of TACAMO aircraft	9	41	13	25	24

[1] Includes costs of R.D.T. & E., procurement of the system and initial spares, and directly related military construction.
[2] July 1 to Sept. 30, 1976.
Source: Annual Defense Department Report, fiscal year 1977, p. 75.

Appendix D–4

Nuclear-Capable Delivery Systems: Navy, Army, and Air Force

NAVY

A. Nuclear-capable delivery systems—current.

Weapon	Nuclear capable delivery platform	Range (kilometers)	IOC date
AAW:			
Terrier	DDG, CG, CGN, CV	Over 15 km	1962.
Talos	CG	Over 120 km	1959.
ASW:			
ASROC	FF, FFG, DD, DDG, CG, CGN		1961.
ASTOR	SS, SSN, SSBN		1963.
Depth bombs	CV (S2, S3 A/C, SH–3 Helo)	S–2 2,095 km (ferry range)	1963.
	P–3 A/C	S–3 5,000 km (ferry range)	
	Allied Maritime Patrol	P–3 9,000 km (ferry range)	
SUBROC	SSN		1964.
Strike: Tactical bombs (various types).	CV (A–6, A–7, S–3 A/C)	A–6 5,190 km (ferry range) A–7 1,150 km (radius of action).	1959 to present.
Strategic:			
Polaris	SSBN	4,630 km	1963.
Poseidon	SSBN	4,630 km	1964.

B. Nuclear-capable delivery systems—actively under development:

Weapon and delivery platform:	*Range in kilometers*
Trident–I, SSBN	7, 000

C. Non-U.S. Navy nuclear-capable delivery systems—current and under development. Our Allies have been provided with numerous weapon systems which could have a nuclear capability but for which there are no plans to provide nuclear weapons support.

ARMY

A. Nuclear-capable delivery systems—current:

System	Range (kilometers)	IOC date[1]
1. Honest John	39	1958
2. Sergeant	140	1962
3. Lance	Greater than Honest John	1973
4. Pershing	725	1963
5. Nike Hercules		1958
6. Sprint		1974
7. Spartan	Several hundred	1974
8. Medium atomic demolition munition (MADM)	NA	1965
9. Special atomic demolition munition (SADM)	NA	1964
10. 8-in. howitzer	14.5	1956
11. 155mm howitzer	14.5	1963

[1] Nuclear capable date.

B. Nuclear-capable delivery systems—actively under development: None.

C. Non-U.S. Army Nuclear-capable delivery systems—current and under development:

System:	*Non-U.S. Forces*
1. Honest John	FRG, France, Greece, Belgium, Turkey, UK, Denmark, Netherlands, and Korea.
2. Sergeant	FRG.
3. Lance [1]	FRG,[2] Netherlands,[2] Belgium,[2] Italy, and UK.[2]
4. Pershing	FRG.
5. Nike Hercules	Korea, Belgium, Denmark, France, Germany, Greece, Italy, Japan, Netherlands, Norway, Taiwan, and Turkey.
6. 8-Inch Howitzer	[3].
7. 155mm Howitzer	[3].

[1] Non-nuclear Lance has been provided to Israel.
[2] Planned but not yet operational.
[3] Most free world countries having sizable Armed Forces possess both the 155mm and 8-inch howitzers. Those countries possessing a nuclear capability are classified.

AIR FORCE

A. Air Force nuclear-capable delivery systems—current:

System	Range (nautical miles) [1]	IOC (year)
1. Minuteman II	6,300+	1965
2. Minuteman III	6,300+	1970
3. Titan II	6,300+	1963
4. B-52	6,000+ to —9,000+	1956
5. FB-111	2,900+	1969
6. SRAM		1972
7. F-4	1,600+	1963
8. F-111	2,500+	1967
9. F-101	1,000+	1957
10. F-106	1,500+	1959

[1] Ranges may not reflect operational conditions. Ranges may vary considerably depending on loading, configuration, mission, flight profile, inflight refueling, etc. Aircraft range is basic ferry range.

B. AF nuclear-capable delivery systems—actively under development:

System	Range (nautical miles) [1]	Estimated IOC (year)
1. B-1	2,200+	1982
2. F-16	2,200+	
3. ALCM		1981

[1] Ranges may not reflect operational conditions. Ranges may vary considerably depending on loading, configuration, mission, flight profile, inflight refueling, etc. Aircraft range is basic ferry range.

C. Non-U.S. air forces nuclear capable delivery systems—current and under development.

System	Range (nautical miles) [1]	Non-U.S. forces [2]
1. F-100	1,600+	Turkey.
2. F-101	1,000+	Canada.
3. F-104	1,450+	Greece, Turkey, Federal Republic of Germany, Italy, Norway, Belgium, Netherlands, and Denmark.
4. F-4	1,600+	Korea, Israel, Taiwan, Japan, Federal Republic of Germany, Turkey, Iran, Greece, United Kingdom, and Spain.
5. F-16	2,200+	To be determined.

[1] Ranges may not reflect operational conditions. Ranges may vary considerably depending on loading, configuration, mission, flight profile, inflight refueling, etc. Aircraft range is basic ferry range.
[2] For many of the Allies possessing these aircraft, there are no plans to provide nuclear weapons support.

Appendix D–5

Statement by Senator James L. Buckley, in the U.S. Senate Concerning "Nuclear Arms," May 25, 1976

[Excerpted from the Congressional Record, May 25, 1976, p. S7893]

Mr. President, since Congress ratified the Strategic Arms Limitation Accords in 1972, we have witnessed the repeated failure of the Soviet Union to comply with the terms of those agreements as defined in associated agreed understandings and in unilateral interpretations by the United States prior to their ratification.

The Soviet Union has conducted an 18-month test program that could upgrade its SA–5 surface-to-air missile antiaircraft system into an antiballistic missile system, a program undertaken covertly before congressional protest caused the Soviet Union to desist. Nevertheless, it is entirely possible that, as a result of this breach of the ABM treaty, the Soviet Union could now possess a 1,000 launcher antiballistic missile system already in place. The Soviet Union has also attempted to frustrate the United States technical means of verifying Soviet compliance by attempts to camouflage its military research and development facilities as well as its construction of ICBM's and submarines. This morning, on the radio, I heard a report that the Soviets have violated still another provision of the Accords by launching ballistic missile launching submarines without dismantling the land-based ICBM's they are to replace.

I have just learned, Mr. President, of still another possible violation that could be of profound importance. During the SALT ratification debate in 1972, we were specifically assured that the Soviet Union would not be allowed, under the terms of the Interim Agreement, to deploy a land-mobile ICBM—and that if it did, the United States would consider such deployment a violation of the accords. The significance of this matter derives from the fact that it is exceedingly difficult to monitor the deployment of a mobile ICBM because of the ease with which it can be hidden.

For the past several months, I have been following reports on the R. & D. program of the most recent Soviet strategic missile, the SS–20 which was originally believed to have only an intermediate range. However, recent assessments indicate that this missile may have intercontinental capabilities.

Because the SS–20 is a land-mobile system, and because the most recent U.S. intelligence estimates suggest that it may have a range capable of hitting targets in the continental United States, we are faced with what may be a significant violation of the 1972 accords, as understood by the Congress.

This new development points out, once again, the magnitude of the military threat which faces the United States, a threat which is a

direct consequence of the aggressive R. & D. and procurement programs being pursued by the Soviet Union.

The only program now underway that can augment the U.S. strategic nuclear capabilities is the deployment of the Minuteman III ICBM's. It is the only strategic weapon delivery system that we are currently producing.

The administration has appealed to Congress to fund continuation of the Minuteman III production so that we may be able to deploy improved ICBM's that will, in part, offset the growth in the Soviet Union's strategic capabilities.

It is unthinkable that the Congress should do other than fully fund the program proposed by the administration and supported by the Armed Services Committee; a program that will keep the Minuteman III in production.

We will not have another ICBM available until the 1980's when the M–X will be completed. In the interim we must be prepared to improve our ICBM capability so that our security interests, with respect to maintaining, strategic balance and deterring Soviet nuclear blackmail, is fully maintained.

Appendix D–6

List of Announced Foreign Nuclear Tests (1975 to Present)

FRANCE

June 5, 1976.
November 26, 1975.

CHINA

October 26, 1975—Less than 20 Kilotons.
January 23, 1976—Less than 20 Kilotons.

RUSSIA

February 20, 1975—20–200 Kilotons.
March 11, 1975—20–200 Kilotons.
April 27, 1975—20–200 Kilotons.
June 8, 1975—20–200 Kilotons.
August 7, 1975—20–200 Kilotons.
August 23, 1975—Multi-Megaton.
October 18, 1975—Multi-Megaton.
October 21, 1975—Multi-Megaton.
October 29, 1975—20–200 Kilotons.
December 25, 1975—20–200 Kilotons.
June 8, 1976—20–150 Kilotons.

APPENDIX E

Deployment of U.S. Nuclear Weapons

E–1. Extract *Annual Defense Department Report, FY 1977*, concerning "Modernization of Theater Nuclear Weapons"—(follows)

Appendix E–1

[Extract from Defense Department Annual Report, fiscal year 1977]

Modernizing Theater Nuclear Forces

U.S. modernization goals fall into the several major areas discussed below.

1. GROUND FORCE BATTLEFIELD SUPPORT SYSTEMS

Army ground force battlefield support systems can provide nuclear strikes near the forward edge of the battle area. They consist of tactical missiles (Lance), rockets (Honest John), and cannon artillery (155 mm and 8-inch). The U.S. will complete its planned deployment of Lance launchers and missiles in fiscal year 1977. Most of these Lance launchers were deployed with U.S. forces in Europe as longer-range, more accurate, and more flexible replacements for Honest John and Sergeant launchers. Two Lance battalions will be based on the U.S. In addition, we will continue to provide Lance as a replacement for Sergeant and some Honest John launchers in allied forces.

Nuclear cannon artillery contributes to deterrence of both nuclear and conventional attacks by providing an important capability for deterring the massing of Pact artillery and armor, and substantially blunting a Pact exploitation attack by destroying armored units and their supporting artillery. This capability derives from cannon artillery weapons being numerous, having a high rate of fire, and being able to strike targets located close to the FEBA where target acquisition is best and air defense is dense. There is a need for cannon artillery capable of firing modern projectiles with advanced nuclear warheads, which overcome the limitation of the current nuclear artillery stockpile.

Engineering development is continuing on a new 8-inch nuclear projectile which has significant advantages over the current round. The new projectile has a much longer range which provides greater target coverage while operating further from enemy forces. It has an improved warhead which greatly reduces undesired collateral damage.

It is ballistically matched to the conventional round and will be highly accurate.

The fiscal year 1977 Defense budget and ERDA budget contain funds to continue development and begin production of the new 8-inch projectiles. Designs for a new, longer-range 155 mm nuclear projectile are also being studied, but there are no current plans to proceed with engineering development. The number of new 8-inch projectiles to be produced has not been decided.

The introduction of Lance and the proposed new 8-inch artillery shell will result in major improvements to the capability to TNFs to assist in blunting a massive Warsaw Pact armored exploitation attack. Nonetheless, we still need to improve the responsiveness and rate-of-fire of our battlefield nuclear systems. In-place units should be able to provide a greater concentration of nuclear strikes to those sections of the forward edge of the battle area where they may be most needed. Nuclear-capable units and nuclear warheads should be more transportable to other sectors of the front, as necessary. We are developing and testing the doctrine to do both.

2. THEATERWIDE INTERDICTION SYSTEMS (TACTICAL AIR, POSEIDON, PERSHING)

Considerable capability for preplanned strikes against a variety of targets in the theater is currently provided by U.S. and allied nuclear-armed tactical aircraft, U.S. and FRG Pershing missiles, the UK Polaris force, and Poseidon reentry vehicles currently committed to SACEUR for use in preplanned strikes in a theater-wide nuclear war. With these changes many of the land-based and carrier-based aircraft which might now be withheld for nuclear strikes on preplanned targets could be available to support a conventional campaign or battlefield nuclear use. This augmentation, combined with the introduction of the Air Force's A–10, F–15, and F–16 aircraft, should improve significantly our conventional airpower.

Tactical air has an inherent ability to concentrate firepower quickly in critical areas (for example, against breakthroughs) and so may be able to take advantage of the improvements expected to the timely exploitation of tactical intelligence. Defeat and disruption of enemy forces from the battle area to the assembly area are being emphasized in mission studies. However, effective use of tactical air nuclear support in this role requires solving several problems: acquisition and identification of non-fixed targets at long range, penetration to target despite heavy air defense, and operation in all kinds of weather. The U.S. is continuing to deploy the newer version of the B–61 nuclear bomb, which provides greater flexibility, improved safety features, and more sophisticated devices for enhanced security.

3. OTHER NUCLEAR SYSTEMS (AIR DEFENSE, ADMS, AND ASW)

The use of any nuclear weapons would decisively change the nature of a conflict. If this most serious step were to be taken, it should be done to induce the Soviet Union to terminate the conflict quickly. That is, it should be done with sufficient decisiveness and shock effect to cause the Soviets to reconsider their actions.

Nike Hercules

The U.S. currently has general purpose force Nike Hercules batteries in Europe, CONUS, Alaska, and in South Korea. Our NATO allies also maintain a number of batteries.

Fleet Nuclear Air Defense Weapons

The U.S. maintains nuclear and conventional antiair warfare (AAW) weapons (primarily Talos and Terrier) for fleet air defense on three aircraft carriers and 35 cruisers and destroyers. A reassessment of afloat deployment concepts and shipfill requirements for nuclear AAW warheads has resulted in a decision to replace some of the on-board Talos and Terrier nuclear warheads with existing conventional warheads. In the future, we will consider phase-out of additional nuclear AAW weapons as equally effective, improved conventional warheads are deployed.

Atomic Demolition Munitions (ADM's)

ADMs are nuclear demolition devices which are manually emplaced and detonated by timer or on command. They could be used to destroy bridges, cave in tunnels or defiles, cut roads, and otherwise supplement conventional barriers to slow enemy movements. ADMs would be most useful where it is difficult to bypass natural barriers, if nuclear release is given early in a conflict, and where time would not permit the installation of conventional obstacles (as would be the case in a surprise attack or unanticipated breakthrough). The utility of earth penetrator weapons in performing the nuclear barrier mission is now under study.

ASW Weapons

The U.S. maintains a variety of nuclear antisubmarine warfare (ASW) weapons. Those include Subroc and Astor for use by submarines, Asroc for surface ships, and the MK–57 bomb for ASW aircraft. The MK–57 is also used by some allied ASW aircraft.

Effective ASW (whether with nuclear or conventional systems) requires detection, classification, and localization of enemy submarines before an attack can be made. Nuclear ASW weapons, because of their large lethal radius, allow for succesful engagement of enemy submarines where localization is not exact. Nuclear ASW weapons also provide a hedge against hardening of enemy submarines and successful enemy countermeasures which reduce the effectiveness of homing torpedoes. Development of improved nuclear ASW systems will be considered where they provide significant advantages over conventional systems.

APPENDIX F

Security of Nuclear Weapons

Appendix F–1

[Extract from annual Defense Department Report, fiscal year 1977]

Peacetime Security and Storage of Nuclear Weapons

The Department places the highest priority possible on protecting nuclear weapons, and security procedures and equipment are being improved. The Munich tragedy of 1972 highlighted for the world a serious threat, and actions have been taken to counter the well-financed, armed, and organized terrorist unit. Congress, properly, has taken an active interest in the security of nuclear weapons and has urged greater security measures at the sites, reduction of the number of weapons and sites worldwide, and improved safety devices on weapons. The improvements which the Department has made and will continue to make should increase the already extensive and redundant security of our nuclear weapons.

The Department has an active program underway to upgrade the security of nuclear weapons while in storage, transit or on alert. A key element of the physical security program is the Permissive Action Link (PAL), a locking device integral to the weapon and designed to deny unauthorized access and prevent use of a weapon for a period of time. Theater nuclear weapons now in production have PAL devices which will disable the weapons permanently but non-violently if they are tampered with. Other measures to assure weapons security include the personnel reliability program (PRP), improved security criteria and standards for protecting nuclear weapons, and improved guidance for nuclear weapons movement, emergency evacuation, and destruction.

Peacetime security of nuclear weapons at storage sites continues to receive attention. The need for each storage site is reviewed regularly by the Department on a site-by-site basis. In evaluating further changes in nuclear weapons storage abroad, a number of factors are being balanced, including survivability of warheads in peacetime storage to a surprise Warsaw Pact attack, security of individual sites under terrorist attack, capability for weapons dispersal in a crisis, and funding implications. We want to consult with appropriate allies before making specific site consolidation proposals to the host nations concerned.

In fiscal years 1976, 197T and 1977, about $230 million is programed for improvements to the security of the storage sites we will retain. The quality of the security of these sites will be improved by better training of security personnel, improved perimeter sensors and lighting, additional guards with more firepower and better communications, quicker reaction capabilities for security forces, plus hardened guard facilities and defensive positions. This program of upgrading security should provide greater peacetime security for TNF's, without compromising their effectiveness for deterrence and war termination.

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[1] Transition.

Appendix F–2

Nuclear Weapon Personnel Reliability Program, January 1, 1975 to December 31, 1975

	United States	Pacific	Europe	Total
Number of personnel in PRP	89,294	6,881	23,450	119,625
Number of personnel permanently disqualified	2,967	293	1,868	5,128
Alcohol abuse	58	10	101	169
Drug abuse	918	133	919	1,970
Negligence or deliquency in performance of duty	530	22	151	703
Court-martial or civil convictions of a serious nature	169	16	160	345
A pattern of behavior or actions which is reasonably indicative of a contemptuous attitude toward the law	580	46	96	722
Any significant, mental, or character threat, or aberrant behavior, substantiated by competent medical authority which is the judgment of the certifying official is prejudicial to reliable performance of duties	712	66	441	1,219

APPENDIX G

Safeguards

Appendix G–1

Nuclear Regulatory Commission Safeguards Program

[Prepared by NRC]

I. THE SAFEGUARDS PROBLEM

A. Definition and Background

The development of the nuclear industry as part of the nation's energy supply system increases the risk of harm to the general public from: (1) theft or diversion of strategic special nuclear material (SSNM) which can be fabricated into a nuclear explosive device or used for dispersal of radioactivity; and (2) sabotage of nuclear material or facilities leading to dispersal of radioactivity. Actions of either type might appeal to dangerous elements in society. Such elements may include criminals, motivated by personal gain (from sale of SSNM or by extortion); extremists, exerting pressure for socio-political or economic change; and disoriented persons seeking revenge for some perceived wrong. While no antisocial incidents involving theft or sabotage are known to have occurred within the nuclear power industry in this country, there have been several in other nations with minor consequences. There have also been an increasing number of non-nuclear incidents of terrorism in this and other countries over the last several years.

Groups that could in theory take hostile action against nuclear plants or materials occupy a wide spectrum, but there is no evidence that any organized or known groups presently intend to commit acts of sabotage, theft, or diversion. For purposes of establishing security controls, two categories of groups are considered most likely to constitute a threat in the future. These are: (1) small group of highly-motivated individuals equipped with light weapons and explosives; and (2) disgruntled employees with access to nuclear fuel industry operations and thus capable of acting covertly.

B. Purpose of Safeguards

The purpose of safeguards is to prevent unauthorized use of SSNM or any sabotage that would endanger the public health and safety or national security. This purpose is embodied in physical security systems and material control and accounting systems which serve to: (1) deter an adversary from attempting theft, diversion, or sabotage; (2) detect such attempts as are made; (3) protect SSNM and nuclear facilities against physical attack; (4) deny or minimize the utility of SSNM to the adversary; and (5) make probable the recovery of stolen SSNM prior to its harmful use. A safeguards system must be designed to balance effective performance against costs. The system should also be responsive to any change in the threat.

C. Importance of Nuclear Safeguards

The unusual nature of nuclear material with its inherent risk to the public demands that proper security precautions be observed. Thus, the need for adequate controls are paramount. Increased nuclear activity including the prospective use of plutonium for reactor fuel adds emphasis to the safeguards mission. Terrorist attacks in recent months have increased the possibility of attempted sabotage or seizure of material for illicit use. Such events have in turn been widely publicized in the press with the result that, although no actual attempts are known to have occurred in the U.S., public awareness and concern is growing because of increased publicity. Finally, safeguards are of concern to this nation from the viewpoint of limiting worldwide nuclear weapons proliferation. As a result of such powerful influences, the Congress, in enacting the Energy Reorganization Act of 1975 (ERA) assigned the Nuclear Regulatory Commission increasing responsibilities for safeguards.

II. NRC SAFEGUARDS RESPONSIBILITIES

A. Congress Directives Defined by ERA of 1974

The Energy Reorganization Act spelled out several specific charges to NRC including:

Monitoring, testing, upgrading of internal accounting systems;

Developing contingency plans to deal with threats, thefts, and sabotage; and

Recommending necessary research to enable the Commission to effectively perform its functions.

1. Materials Accounting

Regarding materials accounting, the NRC considers it essential to know the whereabouts of sensitive materials. Material control and accounting indicators and limits are established to assure that significant quantities of material are not unaccounted for. When the limits are exceeded, action is taken to determine and correct the situation. These signs or indicators cannot always be generated without interrupting normal flows. It is often the case that a process must be shutdown to take an inventory. The material control system is to assure that the material is contained and controlled in the authorized and designated plant areas. The physical protection system supplements this control and provides mechanisms to prevent unauthorized removal. The accounting systems provide assurance that the control system and security system have been effective and that all material is accounted for. Compliance with NRC safeguards rules is verified by actual monitoring and auditing of licensee materials handling operations.

2. Contingency Planning

The Energy Reorganization Act of 1974 charges NRC with the responsibility for developing ". . . contingency plans for dealing with threats, thefts, and sabotage relating to special nuclear materials, high-level radioactive wastes and nuclear facilities resulting from all activities licensed under the Atomic Energy Act of 1954, as amended."

A methodology has been developed that provides for the systematic development of safeguards contingency plans which will give guidance, for Licensees and NRF staff, in the event of threats, thefts, and

sabotage. These contingency plans will contain (1) a preconceived series of decisions and actions leading to the accomplishment of specific objectives, (2) an identification of the data, criteria, procedures, and mechanisms necessary to efficiently effect the decisions and actions, and (3) a specification of responsibilities for each decision and action. This contingency planning approach has been utilized by NRC to develop a complete safe of safeguards plans for the Westinghouse Cheswick Plutonium Facility. The development of NRC Headquarters contingency plans is also well underway. The Headquarters contingency plans will ultimately lead to detailed interagency interface agreements between NRC and ERDA, FBI, DOD and other agencies which will specify action, decision, data and procedural responsibilities.

NRC invited the major fuel cycle licensees to participate in an April 1976 contingency planning working seminar. The objective of the seminar was to appraise the licensees of NRC's contingency planning approach and to solicit their criticisms and advice. A detailed report of the conference is being prepared for transmittal to the JCAE. These activitities will lead ultimately to the development of (1) a Regulatory Guide for licensees to utilize in developing safeguards contingency plans, and (2) an amendment of NRC regulations to require licensees to develop, implement, and execute safeguards contingency plans.

3. Research

A high priority was placed by Congress on the ability of the NRC to obtain the research necessary to discharge its regulatory responsibility with regard to nuclear safeguards. Following the impetus established by the ERA, NRC initiated a strong safeguards confirmatory research effort. In addition to obtaining research services through its own budgetary process, NRC draws heavily upon nuclear safeguards research conducted by the Energy Research and Development Administration. The next step involves taking information developed through research and utilizing it to produce standards, criteria, guides and rules.

The NRC safeguards research program supports the decision making processes involved in rulemaking, licensing, and inspection. It provides systematic methods for predicting and evaluating the performance of alternative safeguards strategies, systems and components.

Studies will be done on what the potential adversary would or could do to perpetrate malevolent nuclear events. Methods, models and data for predicting and evaluating the performance of safeguards systems will be developed. Results from the NRC Safeguards research program, new in fiscal year 1976, are expected to emerge in 1977.

B. Other Safeguards Responsibilities

In addition to specific congressional directives, NRC exercises safeguards oversight by a series of rulemaking, licensing, and inspection and enforcement activities.

1. Rulemaking

The NRC sets forth safeguards practices which the industry must follow via a rulemaking process. Federal regulations, standards, and guides are used to insure that nuclear security measures are adequate.

Such regulatory guidance is then used by NRC staff to determine if plant designs, SNM shipments, or other materials handling operations proposed by commercial groups are acceptable.

2. Licensing

When a company desires to build a plant or utilize nuclear material, an application is made to the NRC. The licensing staff reviews such proposals against the criteria, guides, and rules previously noted. The safeguards review, conducted separately from the safety and environmental analysis, is an integral part of the NRC's evaluation. If the proposal clearly meets NRC's rules for safeguarding nuclear operations, the finding is positive. In cases where more stringent safeguards are needed, but are not clearly specified by the regulations, the license may be approved subject to additional license conditions. Such add-on conditions become legally binding as long as the license is in effect.

3. Inspection and Enforcement

Finally, the NRC staff inspects licensee operations periodically to assure that effective safeguards measures are being followed. The inspectors review activities against overal safeguards rules and the operator's specific license conditions Inspection frequency varies with the type of operations (degree of safeguards risk). At enriched uranium and plutonium fuel plants, for example, more frequent inspections are made to review the operator's material control and vertification methods. Both announced and unannounced inspections are employed to audit the licensee's compliance with Federal requirements. Finally, inspections are made periodically to establish that materials shipments are being conducted according to established security procedures and that proper accountability controls are maintained.

4. International Safeguards

NRC is responsible for licensing the export of nuclear materials. In discharging this responsibility the NRC utilizes information and assessments provided by the Executive Branch agencies, and cooperates with those agencies on export control matters. Additionally, NRC works with the international atomic energy agencies and other nations to strengthen the international safeguards regime.

C. Overall Safeguards Delegations

The specific responsibilities for implementing portions of the NRC safeguards program are as follows:

The Commission makes overall policy determinations.

The Nuclear Material Safety and Safeguards Office is responsible for:

Identification of safeguards policy or program weakness:
The development of policy options for the Commission:
Overall safeguards program development;
Recommending safeguards research and technical development efforts;
All safeguards licensing except for reactors;
Analysis of safeguards related information; and
Coordination with ERDA on common safeguards programs and policy matters.

The Standards Development Office is responsible for:
Standards and codes; and
Recommending safeguards research needed for standards development.
The Nuclear Reactor Regulation Office is responsible for:
Development of safeguards evaluation plans for review of reactor license applications;
Safeguards licensing of reactors; and
Recommending reactor safeguards research.
The Inspection and Enforcement Office is responsible for:
Development of detailed inspection programs;
Inspection of licensees for compliance with regulations and license conditions;
Enforcement of requirements;
Investigation of abnormal occurrences including theft or diversion of SNM; and
Recommending safeguards research based on inspection results.
The Office of Nuclear Regulatory Research is responsible for:
Determining jointly with NMSS and others the safeguards research requirements;
Planning and implementing the safeguards research program;
Coordinating the safeguards research work with the cognizant NRC technical staff;
Assuring appropriate dissemination within NRC of the results of safeguards research; and
Coordination with ERDA and other government agencies on safeguards research.

D. Relationships With Other Agencies

Responsibility for implementation of the nation's nuclear safeguards system is spread among several agencies and organizations. For example:

ERDA implements safeguards in nuclear activities in ERDA license-exempt operations and conducts research related to safeguards technology.

Intelligence gathering responsibilities are shared by: Federal, state and local law enforcement agencies.

The repelling of an initial overt action is currently the responsibility of: the licensee and the local law enforcement agency.

The responsibility for recovery of stolen material is assigned to the Federal Bureau of Investigation assisted by the Emergency Action and Coordination Teams of the Energy Research and Development Administration.

III. NRC SAFEGUARDS ORGANIZATION

During fiscal year 1976 the NRC moved from a transitional organization to a more permanent structure for safeguarding of nuclear materials. The Office of Nuclear Material Safety and Safeguards (NMSS) is charged by the Energy Reorganization Act with responsibility for licensing and regulation of all nuclear facilities and materials associated with processing. handling and transport. The Director,

NMSS, is responsible for upgrading, testing, and monitoring nuclear material accounting systems and developing contingency plans to deal with emergency situations. NRC performs the licensing review responsibilities, and acts as spokesman for the Commission on safeguards matters. Within NMSS, the Division of Safeguards is immediately responsible for program implementation. The NMSS organization is shown in Chart 1. Also included is a chart showing the results of our intensive effort to staff the new office (Chart 2). Inspection, research, and standards development are likewise integral parts of the NRC safeguards functions. These duties are performed in other major programmatic offices as indicated in the overall NRC organization (Chart 3). Finally, total NRC resources associated with safeguards are indicated in Chart 4. In addition to these directly budgeted resources, NRC obtains assistance from other Federal, state, and local agencies.

IV. SAFEGUARDS PROGRAM

A. Concerns

During the past year the NRC spent considerable effort in identifying major safeguards concerns in order to develop a comprehensive understanding of the problems involved. Significant attention was given to shaping basic concepts and theory. These conceptual approaches, although difficult to develop, are now being used to guide NRC staff as they design specific regulatory programs for safeguarding licensed nuclear activities.

B. Guidelines As To Safeguards Purposes and Effectiveness

Effective safeguards have for their purpose the provision for public safety and security by deterrence of: (1) thefts or diversions of nuclear materials, (2) sagotage of nuclear facilities, and (3) hoaxes arising from threatened sabotage or from alleged thefts or diversions, through appropriate measures designed to detect, prevent, or respond to such acts.

To be effective, safeguards must be capable of: (1) preventing, with high confidence, a civil disaster, (2) providing substantial protection against serious civil damage, and (3) providing timely and accurate information on the status of nuclear material and facilities.

To be acceptable, safeguards must take realistic account of the risks involved, and of burdens on the public, in terms of civil liberties, and institutional, economic, and environmental impacts.

C. Activities

1. Security Agency Study Findings

The Security Agency Study was conducted pursuant to Section 204(b)(2) of the Energy Reorganization Act of 1974 to determine if a federal agency was necessary to protect commercial nuclear operations. Of concern were nuclear power reactors, certain fuel plants, and special nuclear materials. The fundamental issue centered around whether armed security personnel should consist of licensee employees or federal guards. The submission of the study to Congress is imminent. Tentative findings indicate there is no need, at this time, to create a security agency to provide federal security forces for the protection of the nuclear industry. In the case of escorts for special

nuclear materials in transit, a problem currently exists concerning the authority of private escorts to carry weapons across state boundaries. In the absence of uniform legislation granting such authority, the use of federal escorts would be more appropriate.

2. Special Safeguards Study

The safeguards implications of allowing widespread use of mixed oxide fuels in the nation's light-water reactors is under intensive review by the Commission. The safeguards analysis will be made a part of the Safeguards Supplement to NRC's Generic Environmental Statement on Mixed Oxides which will be available to the public by mid-1976. Upon publication of the Safeguards Supplement, a public hearing will be held on the safeguards conclusions. The NRC's decision on whether to approve widescale use of mixed oxide fuel will be heavily influenced by the findings of this study.

3. Reactor Protection

The NRC has contracted with Sandia Laboratory to conduct sabotage vulnerability studies of nuclear power reactors. The results of the Sandia study will be used to analyze current regulatory controls and determine if present security requirements are adequate. Following meetings with the Advisory Committee on Reactor Safeguards, the staff plans a comprehensive review of the design implications of the vulnerability studies to determine if plant security could be significantly improved by alterations in the design of future facilities. If the review proves positive, the findings will be incorporated into the regulatory process. During the year, staff prepared a cost-benefit evaluation of a proposed new regulation CFR Section 73.55 which would increase the security measures required for nuclear power reactors. If the new rule is implemented, Regulatory Guide 1.17 will be revised to interpret and furnish guidance on the more stringent requirements. Finally, the NRC staff is cooperating with the American Nuclear Society in their development of an American National Standard for protection of research reactors.

4. Security of Material Shipments

During the year the NRC staff continued development of rules for strengthening the security of material in transit. Under the proposed new rules, the number of guards required for shipment of strategic quantities of nuclear material would be increased. In addition, armored cars would be required for road shipments. Finally, the number of escort vehicles required for road shipments would be increased. The final regulations, upon Commission approval, could be implemented immediately if sufficient justification warrants. Also, during the year, an effective rule was published which requires shippers to notify NRC Regional Offices seven days in advance of planned shipments. Such notice permits NRC to inspect those shipments for compliance with all security and safety requirements.

5. International Safeguards

Implementing Presidential commitments to other nations, the NRC worked with ERDA and the State Department in developing a US/IAEA safeguards agreement. Under the anticipated agreement, the international agency will implement IAEA safeguards controls at selected U.S. nuclear plants including reactors and fuels processing.

IAEA safeguards are designed to detect and deter the diversion of strategic nuclear materials into weapons use. The U.S. has offered to apply the IAEA controls to its commercial operations to demonstrate our willingness to accept the terms of the treaty on the non-proliferation of nuclear weapons, thereby encouraging other nations to do so. The US/IAEA Safeguards Agreement, expected to be approved in 1976, will impose certain requirements on affected operations though U.S. safeguards in general are considered more comprehensive than IAEA rules. Military operations are exempted from the agreement. The NRC, during its first year, established close working relations with several foreign countries to share information on safeguards problems and policies.

D. Progress (Milestones and Accomplishments)

Safeguarding of nuclear material and facilities was considerably strengthened in 1975. In its first year the newly formed U.S. Nuclear Regulatory Commission acted to reinforce and extend existing safeguards in several areas:

The organization changes required by the Energy Reorganization Act of 1974 were implemented to upgrade the federal safeguards effort;

A management team was chosen to fill major executive positions; a major recruiting effort was launched to supplement the safeguards staff;

Commercial plutonium and enriched uranium fuel plants were required to strengthen plant defenses against internal diversions (via implementation of additional safeguards license conditions);

Licensed users of plutonium and enriched uranium were required to strengthen their material control systems by implementing a measurement quality assurance program;

Regulations were drafted to implement a program to require clearances for personnel having access to or control over special nuclear material;

A US/IAEA Safeguards Agreement was drafted with NRC staff assistance to promote international nuclear material controls;

The NRC established a process whereby proposed nuclear exports of significant types and quantities are referred directly to the Commission for review. In addition, safeguards criteria governing export of strategic material were strengthened;

Established contacts with other agencies to aid NRC in threat determination and response force planning; assessed adversary techniques and capabilities; probed systems vulnerabilities;

Completed a major safeguards related study required by Congress;

Completed Security Agency Study directed by Public Law 38–438.

Continued to conduct licensing and regulatory business without interruption during the agency's transition period from AEC to NRC;

Refined basic safeguards goals and developed a conceptual approach toward achieving safeguards objectives; and

Laid out plan for reaching decision on Pu recycle which is being implemented.

E. Potential Problems

1. Adequacy of Current Safeguards

While emphasis is focused on analyzing the safeguards implications of future widescale use of mixed oxide reactor fuel, there is the immediate question of whether present safeguards are adequate. This is a matter of highest concern to the Commission. The Commission believes that with the upgrading of both physical security and materials accountability requirements which has taken place in the last few years, the present safeguards system is generally adequate for current needs. Likewise, the NRC program for safeguarding nuclear facilities and materials involves continual review and improvement. In early 1976, for example, field audits were made of several fuel plants handling highly-enriched uranium and plutonium. The inspections revealed several areas where accounting and control procedures and physical protection systems required improvement within the current regulatory framework. The Commission directed the staff to implement corrections without delay.

2. One Incident Could Trigger Others

NRC has been advised by expert consultants that one attempted theft or sabotage of nuclear materials could trigger a series of similar attempts. We must be prepared to respond to such a possibility however remote it may be.

3. An Incident Could Cause Strong Reactions

Consultants have also told NRC they believe an attempted bombing, attack, or theft of material at a nuclear facility could trigger a strong public reaction. They are of the opinion that such a reaction could occur even if safeguards controls were 100% effective in preventing the incident. The NRC believes that the public must be fully informed concerning the kinds of safeguards measures which are presently in effect at nuclear installations to protect against malevolent acts, because this knowledge of strong safeguards measures serves as a deterrent by making civilian nuclear facilities unattractive to terrorists. The perfect record of 25 years of operation with no significant incident must be recounted to bring perspective to the matter.

4. Cost of Effective Safeguards

The continual NRC review and improvement of techniques for safeguarding nuclear facilities and materials frequently results in changing regulatory requirements. Consequently, industry is sometimes faced with new safeguards conditions which may result in some economic burden or operational difficulty. However, experience to date indicates that the cost of implementing effective safeguards is a very small part of the cost of facility activities, while operational difficulties have not been great. Both NRC and industry are committed to assuring adequate safeguards, commensurate with the potential risks involved.

F. Plans and Priorities

During the next year, the NRC will continue to develop guidance to adequately safeguard current nuclear activities. More field audits,

inspections, and evaluations are planned to test both material controls and plant protection systems. A significant effort will be made to develop safeguards systems which will be able to perform well as the size and nature of the security problem evolves. The following activities are among the priority assignments which will occupy NRC's attention in the coming months:

Defining the source of threat is a continuing challenge. We have established helpful intelligence liaison with other agencies for this purpose.

Assessment of threat capabilities, a follow-on to the above function, is conducted by NRC analysts in close liaison with close inliaison with intelligence agencies.

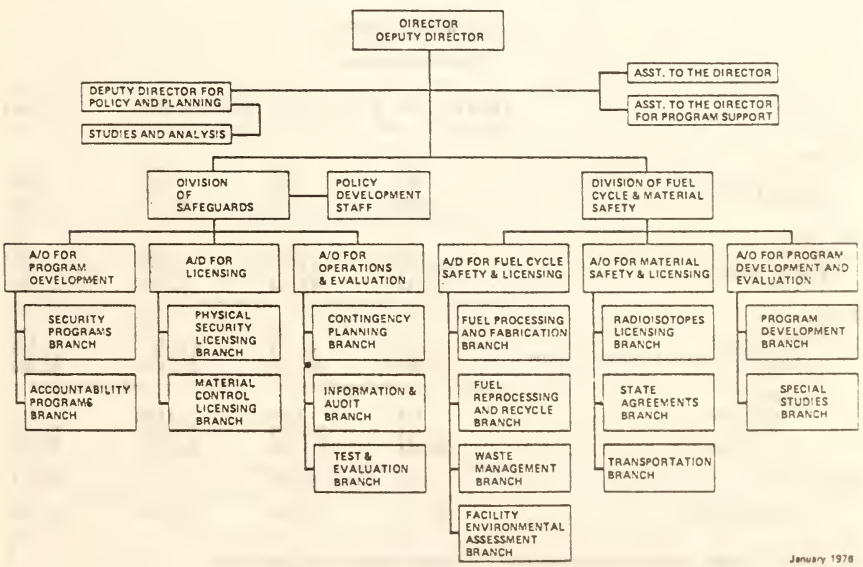
Responding to specific safeguards problems. This will be handled by assigment of required staff to review unusual incidents or circumstances, report conclusions, and recommend necessary corrective action to management.

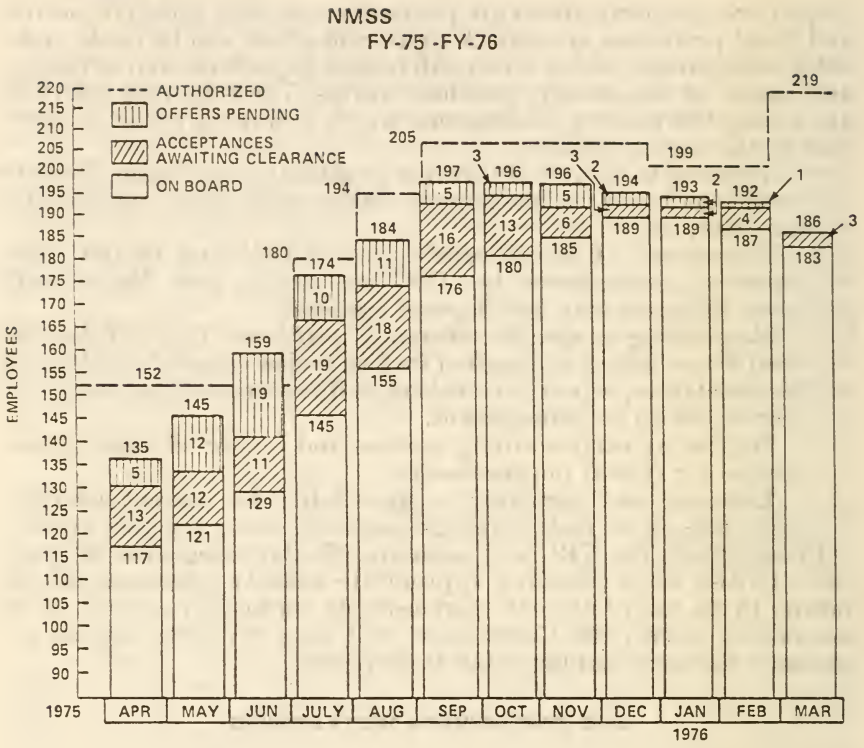
Improving early-warning systems and review of ongoing programs for system improvements.

Licensing and regulatory responsibility for current activities will increase as more strategic materials enter the fuel cycle.

In conclusion, the NRC will maintain effective safeguards for present activities while planning appropriate security programs for the future. In the role of ultimate responsibility for nuclear security in the commercial sector, the Commission will take whatever actions are necessary to insure that the public is protected.

OFFICE OF NUCLEAR MATERIAL SAFETY & SAFEGUARDS





NRC SAFEGUARDS BUDGET

[Dollars in thousands]

Type	Fiscal year 1975	Fiscal year 1976	Fiscal year 1977	Change
Reactors:				
Personnel	(12)	(19)	(22)	(3)
Program support	$15	$271	$448	$177
Total cost	$356	$846	$1,322	$476
Fuel cycle:				
Personnel	(64)	(103)	(139)	(36)
Program support	$1,009	$4,091	$4,068	$23
Total cost	$2,241	$7,304	$9,388	$2,084
Materials:				
Personnel	(17)	(48)	(48)	(19)
Program support	$1,387	$5,963	$11,291	$5,328
Total cost	$1,087	$7,117	$13,643	$6,526
Total direct:				
Personnel	(93)	(170)	(228)	(58)
Program support	$2,411	$10,325	$15,807	$5,482
Total cost [1]	$2,684	$15,267	$24,353	$9,086
Indirect cost: [2]	$716	$2,633	$3,647	$1,014
Total program cost	$4,400	$17,900	$28,000	$10,100

[1] Total cost includes program support, administrative support, personnel cost, and travel.
[2] Indirect cost includes the cost of the PTS and PDA offices.

Note. Safeguards is 11.2 pct. of fiscal year 1977 budget. A 56.4 pct. increase over fiscal year 1976.

Appendix G–2

ERDA Nuclear Materials Security and Safeguards Program

[Prepared by ERDA]

The ERDA Nuclear Materials Security and Safeguards Program and the budget estimates reflecting program planning are presented in this report.

Security and safeguards include all measures conceived, developed, and applied to nuclear facilities for control and protection of special nuclear material. First, security and safeguards include necessary physical security; for example automatic alarms, fencing, guards, etc. Second, security and safeguards utilize material monitoring techniques and automatic and manual accounting systems, as applied to each particular nuclear process, to provide strict control and accountability of the material as it moves through the process, material in storage and material being transported for further uses. Finally, security and safeguards consider the important human interface by assuring that systems are reliable, maintainable, and operable by conventional industrial employees after a short training period.

The program considers and is designed to satisfy the needs of concerned agencies and industries. The first objective is to provide factual information concerning possible diversion paths, possible adversary actions, and possible counters that can be considered by ERDA, the Nuclear Regulatory Commission, the International Atomic Energy Agency, and the various nuclear industries involved in defining safeguards requirements, regulations, plans, and training programs. The second objective is to assist the International Atomic Energy Agency in developing a strong technological understanding of available safeguards systems in order that credible national systems will be specified and implemented. The third objective is to provide for development, installation, test, and evaluation of subsystems of the more promising concept designs in ERDA and commercial facilities, thus proving the adequacy of the design by demonstrating operability, maintainability, and reliability. Assessment of these systems provides firm data for use in attaining cost effectiveness in large scale implementation of security and safeguards measures.

The security and safeguards program has been carefully coordinated with the Nuclear Regulatory Commission, the Arms Control and Disarmament Agency, and the Department of Defense, all of whom have vital interests in this area. Continuing consultation with IAEA enables the program to consider international requirements for unusual safeguards technology.

The estimated budget authority for the security and safeguards program is:

[Dollars in thousands]

	Fiscal year 1975	Estimate fiscal year 1976	Transition quarter	Estimate fiscal year 1977
1. Research and Development	$4,339	$11,592	$2,670	$21,756
2. Operation of Safeguards Analytical Laboratory	929	1,153	329	2,360
3. Nuclear Materials Reports and Analysis System	400	535	167	800
4. Technical Support Organization	565	339	211	824
Operating funds	6,233	13,619	3,377	25,740
Capital equipment	675	2,220	611	2,400
Construction	3,500	800	0	0
Nuclear materials security program	10,408	16,639	3,988	28,140

Note: The a bove funds, budget authority, are only those in the budget for the safeguards and security program administered by the Division of Safeguards and Security.

1. RESEARCH AND DEVELOPMENT

The substantial increase in fiscal year 1977 operating funds is primarily for a major research and development program in support of the protection of special nuclear material at both commercial and Government sites. This research and development program includes (a) development and evaluation of new security and safeguards technology into comprehensive, integrated systems to enhance material protection at various types of facilities. The program utilizes and further develops the firm technological base in physical security, materials control and nondestructive and chemical assay of sepcial nuclear material commenced earlier and continued through 1976. In fiscal year 1977, the installation, test and evaluation of integrated safeguards systems are proposed for important classes of nuclear facilities and a corresponding increase is proposed in this year's operating budget, from about $17 million in fiscal year 1976 to $28 million in fiscal year 1977.

The R. & D. effort includes threat definition. Threat data developed is then used to provide credible inputs to computer models, developed in prior years, and used in engagements of threats against safeguards concepts for various classes of facilities. From such modeling comes data to define the adequacy of the safeguards concept, the hazards remaining, and the resultant consequences to be expected. Cost effective comparison of the various concepts can be obtained and factual data provided to serve as a basis for definition of safeguards regulations and requirements. The more promising of these concepts are carried through design, development, test, and evaluation in typical classes of facilities existing within ERDA.

These demonstrations include integrated safeguards systems for a test reactor, a plutonium recovery facility and a plutonium storage facility. These systems, once installed, tested, and evaluated will remain as part of the facilities.

A major effort in the fiscal year 1977 R. & D. program is to support development of safeguards concepts for the light water reactor fuel cycle. The cycle includes fuel processing, fuel material manufacture, fuel element fabrication and associated waste management. Conceptual designs will draw on the information obtained from the subsystem

development, test and evaluation effort and provide a growing amount of data for meeting the safeguards challenges of the breeder reactor program.

Development also continues of an emergency reaction capability, with concentration on miniaturization and improved sensitivity of detection systems. These systems are engineered to provide a search and recovery capability for use if, by some mischance, special nuclear material is lost by theft or overt action.

The assessment program reviews and evaluates the adequacy of safeguards measures at ERDA and contractor facilities and assures compliance with policies and regulations. The program is implemented by inspections and appraisals to maintain continuous awareness of the effectiveness of ERDA field offices and ERDA facilities safeguards programs. These programs provide for guarding special nuclear material, classified information and Government property. The aspects of the programs which are viewed and inspected are physical protection, nuclear material control, and personnel control systems and procedures.

Assessments are made to determine whether existing requirements are adequate and cost effective in the environment in which they are implemented. The assessments are accomplished principally by an on-site ERDA team.

2. OPERATION OF SAFEGUARDS ANALYTICAL LABORATORY

The ERDA-operated New Brunswick Laboratory (NBL) provides analytical (chemical and isotopic) support to the Agency's nuclear materials program. This support includes the development, application, and evaluation of automated chemical analytical methods; the measurement of inventory verification samples taken by ERDA inspectors from license exempt contractors; measurement of samples received from other agency programs; and the development, characterization and distribution of reference materials used to calibrate measurements throughout the nuclear community. The total analytical workload is estimated at about 2,200 samples for fiscal year 1976 and an increase to about 2,800 samples for fiscal year 1977 which includes NRC and IAEA samples. NRC will use NBL for analysis of verification samples on a cost recovery basis. The International Atomic Energy Agency plans to use part of NBL capability to serve as one of the network laboratories located throughout the world for analysis of IAEA inventory verification samples on a cost recovery basis. ERDA supports IAEA use of NBL as contributing to the success of IAEA safeguards operations under the Non-Proliferation Treaty.

As a result of the reorganization of the AEC into ERDA and NRC, all funding for the analytical methods research and development performed by NBL will be supported by ERDA and is included in the fiscal year 1977 NBL budget.

3. NUCLEAR MATERIAL REPORTS AND ANALYSIS SYSTEM (NMRAS)

This is the official computerized system for collecting and reporting data regarding the amount, location, movement, and form of source and special nuclear material for ERDA management purposes. The continued development and wider utilization of the system in the safeguards program requires that additional funds be provided in order to assure that the system will meet growing needs on a timely basis.

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Additional safeguards interacting procedures are being developed and implemented between field locations and the central data base. This effort includes modernizing the input/output interfaces of materials transfer to allow near real time processing of data. Detailed transportation data elements are also under development to be on line in mid-fiscal year 1977. The system can then provide inventory and status information for all U.S. material should be a nuclear threat develop.

4. TECHNICAL SUPPORT ORGANIZATION (TSO)

Established within Brookhaven National Laboratory, TSO acts as an advisory group to the ERDA Division of Safeguards and Security, providing advice and assistance on a task basis as requested. An increase is proposed in effort on tasks planned for fiscal year 1977 including: (1) continued review and evaluation of R&D programs and proposals; (2) completion of studies of consequence assessment and of adversary resource requirements; (3) continued development of a physical-protection computer simulation model; (4) continued technical assistance for international safeguards; and, (5) expansion of ERDA Manual Appendix on nuclear materials safeguards methods.

PROGRAM DIVISION SAFEGUARDS

The total ERDA safeguards effort includes activities funded by several other program divisions in addition to those of the Division of Safeguards and Security. The estimated budget authority for safeguards in the various ERDA program are:

SUMMARY OF ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION SAFEGUARDS BUDGET AUTHORITY FOR FISCAL YEARS 1975, 1976, AND 1977

[Dollars in thousands]

Program	Fiscal year 1975	Fiscal year 1976	Transition period	Fiscal year 1977
Basic energy sciences	$2,272	$9,391	$974	$4,087
Fission power reactor development	4,054	6,970	1,617	4,103
Naval reactor development	2,545	10,678	1,110	5,445
Weapons materials production	6,121	8,540	2,082	16,624
Uranium enrichment activities	2,221	8,317	764	9,443
Weapons activities	56,575	67,008	14,807	92,379
Nuclear materials security and safeguards	10,408	16,639	3,988	28,140
Total Energy Research and Development Administration budget authority	84,196	127,543	25,342	160,221

In addition, safeguards for all program divisions have been grouped into six categories on safeguards functions:

Category	Fiscal year 1975	Fiscal year 1976	Transition period	Fiscal year 1977
Research and development	$21,408	$27,121	$7,363	$45,979
Communications	1,532	2,438	246	1,751
Transportation	15,027	17,778	3,215	27,903
Plant protection	35,162	64,647	10,719	62,431
Material control and accountability	7,947	12,113	2,888	16,525
Detection and response	3,120	3,446	911	5,632
Total Energy Research and Development Administration safeguards budget authority	84,196	127,543	25,342	160,221

Fiscal year 1977

The proposed fiscal year 1977 budget of $160.2 million provides an increase of $32.7 million (26 percent) over fiscal year 1976. This overall increase includes $16.5 million in operating for expanded fixed site security R. & D. as well as operating increases for strengthening and compensating for inflation in each category. The overall increase also includes a net increase in capital equipment and construction of $3.6 million (8 percent), due to increases and decreases in the various categories, the largest being a $6.5 million increase in capital equipment plus construction for improvements in protective measures for weapons transportation.

Appendix G–3

International Safeguards Initiatives

[Prepared by ERDA]

There have been several efforts during the past year to cooperate with other nations on the safeguards of nuclear material. ERDA has sent teams of experts to potential recipient countries to discuss U.S. policy with their leaders in the nuclear field, to review their physical security programs and to evaluate first hand their physical security measures and regulations by conducting on-site reviews of specific nuclear sites. Also, with the NRC, ERDA has conducted joint bilateral technical discussions in the United States with experts from ten countries receiving and/or using relatively large quantities of special nuclear material. These discussions include visits to the Sandia Laboratories and Los Alamos Scientific Laboratory, and in specific cases, visits to U.S. reactor and fuel fabrication plants. Topics for review and discussion include R&D to improve physical security and nuclear material detection and measurement, as well as current practices in U.S. facilities.

ERDA has been a principal contributor in assisting the IAEA in drafting recommended physical security measures for member states. In June 1972, the IAEA published recommendations of a panel of experts which included significant contributions from the United States. In April 1975, these recommendations were again reviewed and updated by a group of experts including four from the United States. These revised recommendations have been promulgated to member states in the form of an IAEA report, "The Physical Protection of Nuclear Material (INFCIRC/225, dated September 1975)."

ERDA was impressed with the attitude of the authorities in each of the countries visited—an attitude exhibited within both government and private sectors. Each country visited has a system for physical protection of nuclear matter; but such protection varied from being very sophisticated to being in need of major upgrading. Strengths and weaknesses and plans for upgrading and/or implementing necessary measures were key items of discussion with the foreign security experts during the visits.

Appendix G–4

IAEA Safeguards Implementation

(Prepared by ERDA)

EVIDENCE OF EFFECTIVENESS

There is extensive evidence that IAEA has an effective safeguards system. Safeguards agreements having the force of treaties have been entered into by IAEA and the nuclear supplier nations and many of the non-nuclear weapons states throughout the world. The content of these agreements is spelled out formally in the Agency's documents INFCIRC/66 and INFCIRC/153. These agreements, which are made public, specify the provisions under which safeguards are applied to all facilities within a country, if under NPT safeguards; or are applied to specific facilities if covered under other arrangements with IAEA. The agreements establish the rights of the IAEA to apply safeguards and the situations where safeguards are to be applied. The agreements make extensive provision for routine safeguards procedures as well as special procedures to be used when IAEA encounters abnormal situations.

IAEA has assembled an extensive body of resources for implementing their safeguards including 41 staff members regularly participating in inspections and inventory vertification for the Agency. During the year ending June 30, 1975, the Agency carried out 502 inspections in thirty-seven States. Of the 502 inspections, 178 were made of power plants, 97 of bulk fuel fabrication plants, and 227 of other facilities including research reactors. The effort now involved in a typical inspection ranges from 1 man for a ½-day to inspect seals up to 3 or 4 men for 2 or 3 days to inspect a complex fuel cycle facility. During the inspections, sophisticated equipment is being used for inventory and recording devices are being used for surveillance of plant activities. At the end of 1975, 77 cameras and 21 nondestructive assay instruments were in use by the inspectors; annually they are using two thousand seals and taking five hundred samples for chemical analysis.

Additional public evidence in support of the effectiveness of IAEA safeguards includes their detection and public disclosure last year that about ½ kilogram of enriched uranium containing some 100 grams of uranium 235 is missing at a facility outside the United States and has, in fact, disappeared. IAEA declined to publicly identify the country or the facility since the amount was so small.

There are U.S. nationals within the IAEA at all levels of the staff ranging from the Board of Governors to the actual inspector force which has three U.S. inspectors now and IAEA anticipates having three more in April, 1976. A U.S. national who recently served as an

IAEA inspector believes that IAEA safeguards are an effective deterrent to diversion of nuclear materials within the present framework of Agreements and IAEA responsibilities.

LEVEL OF EFFECTIVENESS

The IAEA capability for detecting significant diversion is high. If an inspector finds any small problem, he has the right to pursue it until he finds a satisfactory answer. The real effectiveness of nuclear safeguards, therefore, is reflected in the effectiveness of nuclear materials accountancy and verification by IAEA. Experts from member states have officially advised IAEA that annual goals for verification of material accountancy by IAEA inspectors should be in the range of 1–8 kilograms of plutonium and 1–25 kilograms of contained uranium 235. The smaller amounts apply to facilities with smaller amounts of material and the larger amounts to facilities with larger amounts of material.

For facilities with very large quantities of material, Dr. Rometsch, IAEA Inspector General, recently gave the following table of measurement accuracies achievable today.

IAEA expected accuracy (standard deviation) of a material balance expressed as percent of throughout or inventory

Type of facility:	*Expected operator's accuracy (percent)*
Uranium isotope enrichment	±0.2
Uranium fuel fabrication	±0.3
Plutonium fuel fabrication	±0.5
Uranium in power reactors	±0.2
Reprocessing, uranium line	±0.8
Reprocessing, plutonium line	±1.0

Inspection frequency as set forth in the IAEA standard agreements was established on the basis that the detection of diversion would occur before the material could be converted to a form needed for weapon material. The frequency of present IAEA inspections increases with increasing amounts of nuclear materials flowing through the facility or present in the facility. The Agency criteria for inspection frequency reflects plant "operators practice expected by the Agency"; the number or inventories to be verified by the Agency might, at the limit, be equal to those taken by the operator. Practices reflect safeguards needs as well as economics and operational safety. Where this criterion would not provide adequate safeguards, other techniques are used to supplement inventory verification. For example, a nuclear power plant with heavy water moderator, natural uranium fuel and on-line refueling is inspected monthly to examine photos from automatic cameras to assure that irradiated uranium fuel (low value) is not diverted from long-term recoverable storage (no inventory-taking) for recovery of the plutonium. Where reprocessing plants will produce large quantities of plutonium in purified form, there is a risk of "trickle diversion" within the measurement limit of accuracy over a long period of time; the IAEA is planning for continuous inspection to counter this risk.

TIMELINESS OF IAEA SAFEGUARDS

There are limits on the quickness with which a nation could fabricate nuclear weapons once the necessary materials were obtained. It appears that India took several years. It is estimated that a crash effort

of one or two years would be required if reasonable weapon efficiency is expected and designs have been worked out previously. An unsafe and unreliable terrorist-type explosive device or a terrorist dispersal device could be made by a group with sufficient technical competence in a few months unless extensive chemical processing were required (e.g., use of spent fuel elements).

The timeliness of the IAEA detection and reporting system are such that a weapon quantity diversion would be detected within a few months. Thus, the IAEA detection and reporting system is designed to be fast enough for timely detection of a crash effort by a nation to develop a nuclear explosive device of reasonable efficiency.

IAEA depends on member states to counter any threat of terrorist theft of nuclear materials for a crude or low efficiency nuclear device. IAEA has provided recommendations to member states, "The Physical Protection of Nuclear Material" (INFCIRC/225), for countering such threats.

THREAT OF UNDECLARED OR CLANDESTINE FACILITIES

IAEA does not seek out undeclared of clandestine nuclear facilities: these are activities of the member states. Information to the effect that another state had diverted nuclear materials in violation of the Nonproliferation Treaty would be quickly and carefully investigated by the United States with a view to establishing the seriousness of the action and its potential threat to the United States. All available information is reviewed and taken into account in this regard, including proprietary information from industry, communications with other countries, information routinely reported by the Foreign Service (State Department) and intelligence information. The U.S. must rely in part on a strong intelligence capability. Mechanisms for U.S. interagency coordination and consultation on proliferation-related matters include a group under the aegis of the National Security Council.

U.S. ASSISTANCE TO INTERNATIONAL SAFEGUARDS

The total IAEA budget was $27 million in 1975 of which $4.8 million went for safeguards. The amount for safeguards increases to $6.1 million in 1976. These funds are being used to increase and upgrade the inspection effort, including the hiring of additional inspectors, adding inspection equipment and improving the nuclear materials information system.

Additional assistance is provided along with the following lines:

(a) Policy and technical level experts attending IAEA working groups covering all aspects of safeguards systems plans and operations;

(b) Analysis of problems or documents on IAEA's safeguards by experts at ERDA's National Laboratories;

(c) Support for IAEA development of inspection techniques for advanced facilities including inspector exercises at nuclear power plants, spent fuel reprocessing plants and fuel fabrication facilities;

(d) Development of working documents for use by the IAEA staff, such as the IAEA "Safeguards Technical Manual";

(e) Training for IAEA inspectors in chemical and nondestructive assay techniques and loan of advanced U.S. equipment for use in inventory verification;

(f) Technical support for IAEA expansion activities including initiation of the ADP based nuclear materials information system and initial operation of IAEA laboratory facilities;

(g) Support and encouragement for IAEA expansion of its safeguards role in physical protection of facilities and shipments including the preparation and publication of recommendations for the "Physical Protection of Nuclear Material."

The United States has continually worked to upgrade and strengthen IAEA safeguards against the threat of national diversion. Typical of emphasis in the recent past and at present include the improvement of nuclear materials accountability and inventory verification techniques. To meet evolving safeguards needs in the world nuclear power market, therefore, the United States began a first series of 39 specific U.S. safeguards training courses at Argonne National Laboratories in 1968. The series of courses ran a total of 79 training weeks and was completed in May 1973. Among participants were 69 foreign country representatives including 4 from IAEA and 17 from Euratom. In 1976, the U.C. and other member states are again cooperating with IAEA on another training program for personnel of member states with responsibilities in the safeguards area; this training program to be provided by IAEA.

In 1975, United States, IAEA and other States cooperated on the preparation of recommended "Elements of States Systems of Accountability for and Control of Nuclear Materials." In August, 1975, 3 expert U.S. consultants were provided by ERDA to IAEA in Vienna for three months to help bring the computer based nuclear material information system into operation and train IAEA staff.

The U.S. is dealing with the continuing need for better inventory verification technology within its own aggressive research and development program. The need exists for domestic as well as international safeguards and extends to both the instrumentation and training in the use of such instrumentation. As of the end of 1975, IAEA had 21 nondestructive assay instruments in use and the U.S. was providing a portable gamma detector; a portable neutron counting system, uranium and plutonium standards for Agency use; and support equipment for use in connection with neutron flux monitors now under field test and evaluation.

In 1975, training was provided by the U.S. for IAEA inspectors on special aspects of nondestructive assay equipment (12 IAEA inspectors-1 week), and chemical assay of samples (2 inspectors-3 weeks); two additional courses in nondestructive assay equipment are planned during 1976 for a total of 30 IAEA inspectors.

The U.S. assistance to development of better international safeguards is proposed to continue and grow in the future. The U.S. will assist in improving the ADP-based nuclear materials information system used by IAEA for the safeguards program.

The Agency's need to obtain better optical surveillance equipment includes both TV and photographic systems. More widespread use of this equipment is needed for unattended monitoring of storage areas for plutonium and spent fuel as well as the product load-out areas of spent fuel reprocessing plants and isotope separation facilities.

Major commitments of funds beginning in fiscal year 1977 and continuing through future years are required to develop and fully test IAEA safeguards systems which will be required in the various different types of large sophisticated nuclear fuel cycle facilities which will be processing uranium and plutonium under IAEA safeguards. Such facilities include: spent fuel reprocessing plants, isotope separation plants, and fuel fabrication plants.

Appendix G–5

A Comparison of Existing IAEA Safeguards and U.S. Safeguards Requirements

[Prepared by ERDA]

The prime objectives of international safeguards and domestic safeguards are different, as well as the legal authority for operation; accordingly, the activities and requirements are not the same.

The international safeguards objectives can be viewed as: timely detection of a national government diversion of nuclear materials contrary to an international commitment made by that government; deterrence of such diversion through risk of early detection and political sanctions.

The U.S. domestic safeguards objective can be viewed as: Guarding against loss or diversion of nuclear material or sabotage of nuclear facilities, by individuals or groups, and guarding against the resultant threat to the U.S. common defense and security and public health and safety.

The underlying authority for application of IAEA safeguards in a country is the cooperation of that sovereign nation and its voluntary acceptance of IAEA safeguards. In contrast, the underlying authority for domestic safeguards is the mandatory subjection of individuals or groups under U.S. jurisdiction to U.S. laws and regulations.

As indicated in the table below, the IAEA has neither the obligation nor the authority to prevent physically the diversion of nuclear material subject to its safeguards. Establishment of such obligation and authority would require nations to agree to giving international civil servants employed by the Agency the right to use force within their borders and thus to exercise a police power. Nations have to date not been willing to give up this much sovereignty. However, an Agency panel has made recommendations concerning physical protection systems, for use by member States as they may choose; and the U.S. is working with the IAEA and with other nations in support of the adoption by all of sound physical protection measures.

The availability and use of safeguards techniques for domestic and international safeguards are summarized below:

Technique	U.S.-domestic safeguards	IAEA-international safeguards
1. Accountancy/inspection (design review, records and reports systems, quantity verification, etc.).	Yes	Yes.
2. Surveillance (live or TV or film monitoring, seals, electronic detectors etc.).	Yes	Yes.
3. Physical protection (armed guards, fences, locks, special vehicles, vaults, walls, etc.).	Yes	No.
4. Personnel clearance requirements	Yes	No.
5. Pursuit, apprehension, and recovery of diverter and diverted material.	Yes	No.
6. Punishment/sanctions	Arrest, trial, imprisonment for diversions; fines for infractions.	Notification of diversion to all IAEA members and U.N. Security Council and General Assembly; possible withdrawal of aid; possible expulsion from IAEA.

With respect to transport, other than employing seals on certain shipments of nuclear materials, the Agency has not played an active role in applying safeguards during transport. Diversion during transport is guarded against by physical protection techniques employed by the country with jurisdiction. Detection of such diversion, however, can be accomplished through such safeguards procedures as verifying the integrity of seals and measuring material at the shipping and receiving facilities.

APPENDIX H

Tables

Appendix H–1

AGREEMENTS FOR COOPERATION IN THE CIVIL USES OF ATOMIC ENERGY

	Scope	Effective date	Termination date
A. BILATERALS WITH INDIVIDUAL COUNTRIES			
Country:			
Argentina	Research and power	July 25, 1969	July 24, 1999
Australia	do	May 28, 1957	May 27, 1997
Austria	do	Jan. 24, 1970	Jan. 23, 2014
Brazil	do	Sept. 20, 1972	Sept. 19, 2002
Canada	do	July 21, 1955	July 13, 1980
China, Republic of	do	June 22, 1972	June 21, 2014
Colombia	Research	Mar. 29, 1963	Mar. 28, 1977
Finland	Research and power	July 7, 1970	July 6, 2000
Greece [1]	Research	Aug. 4, 1955	Aug. 3, 1974
India	Power (Tarapur)	Oct. 25, 1963	Oct. 24, 1993
Indonesia	Research	Sept. 21, 1960	Sept. 20, 1980
Iran	do	Apr. 27, 1957	Apr. 26, 1979
Ireland	do	July 9, 1958	July 8, 1978
Israel	do	July 12, 1955	Apr. 11, 1977
Italy	Research and power	Apr. 15, 1958	Apr. 14, 1978
Japan	do	July 10, 1968	July 9, 2003
Korea	do	Mar. 19, 1973	Mar. 18, 2014
Norway	do	June 8, 1967	June 7, 1997
Philippines	do	July 19, 1968	July 18, 1998
Portugal	do	June 26, 1974	June 25, 2014
South Africa	do	Aug. 22, 1957	Aug. 27, 2007
Spain	do	June 28, 1974	June 27, 2014
Sweden	do	Sept. 15, 1966	Sept. 14, 1996
Switzerland	do	Aug. 8, 1966	Aug. 7, 1996
Thailand	do	June 27, 1974	June 26, 2014
Turkey	Research	June 10, 1955	June 9, 1981
United Kingdom	Research and power	July 21, 1955	July 20, 1976
Do	Power	July 15, 1966	July 14, 1976
Venezuela	Research and power	Feb. 9, 1960	Feb. 8, 1980
Vietnam, Republic of	Research	July 1, 1959	June 30, 1979
B. BILATERALS WITH INTERNATIONAL ORGANIZATIONS			
Organization:			
European atomic energy community (EURATOM).	Joint nuclear power program	Feb. 18, 1959	Dec. 31, 1985
EURATOM	Additional agreement to joint nuclear power program	July 25, 1960	Dec. 31, 1995
International Atomic Energy Agency (IAEA).	Supply of materials, etc	Aug. 7, 1959	Aug. 6, 2014
INTERNATIONAL AGREEMENTS			
1. Special arrangements:			
United States-U.S.S.R	Agreement on scientific and technical cooperation for the peaceful uses of atomic energy.	June 21, 1973	June 20, 1983
United States-Romania	Memorandum on cooperation in peaceful uses of atomic energy.	Jan. 1, 1973	[2]

[1] Superseding, research and power agreement in abeyance; U.S. material covered by IAEA (NPT) safeguards.
[2] Remains in effect until representatives of the USERDA and Government of Romania have the opportunity to discuss a renewal of the memorandums.

Appendix H–2

NONPROLIFERATION TREATY AND SAFEGUARDS STATUS OF COUNTRIES WITH WHICH THE UNITED STATES HAS AGREEMENTS FOR COOPERATION

Country	NPT status	Safeguards
Argentina		IAEA trilateral.
Australia	Ratified	IAEA–NPT.
Austria	do	IAEA–NPT.
Brazil		IAEA trilateral.
Canada	Ratified	IAEA–NPT.
China (Republic of) [1]	do	IAEA trilateral.
Colombia	Signed, but not ratified	IAEA trilateral.
Finland	Ratified	IAEA–NPT.
Greece	do	IAEA–NPT.
India		IAEA trilateral.
Indonesia	Signed, but not ratified	IAEA trilateral.
Iran	Ratified	IAEA–NPT.
Ireland	do	IAEA–NPT.
Israel		IAEA trilateral.
Italy	Ratified	Agreement for cooperation.
Japan	do	IAEA trilateral.
Korea [2]	do	IAEA trilateral.
Norway	do	IAEA–NPT.
Philippines	do	IAEA–NPT.
Portugal		IAEA trilateral.
South Africa		IAEA trilateral.
Spain		IAEA trilateral.
Sweden	Ratified	IAEA–NPT.
Switzerland	Signed, but not ratified	IAEA trilateral.
Thailand	Ratified	IAEA–NPT.
Turkey	Signed, but not ratified	IAEA trilateral.
Venezuela	Ratified	IAEA trilateral.
Viet Nam	do	IAEA–NPT.
United Kingdom [3]	do	

[1] An NPT safeguards agreement has not been concluded between the IAEA and ROC as a result of the ROC's expulsion from the IAEA in December 1971. The IAEA trilateral safeguards agreement, however, is still in effect and being implemented.

[2] Conclusion of an NPT safeguards agreement is underway with IAEA.

[3] The United States/United Kingdom Agreement for Cooperation in the power reactor field envisages the application of IAEA safeguards on any enriched uranium provided by the United States. No such material has been provided to date under that agreement.

Note.—The non-nuclear-weapon states of Euratom (Belgium, Denmark, Federal Republic of Germany, Ireland, Italy, Luxembourg, and The Netherlands) are NPT parties and are in the process of bringing into force an IAEA/Euratom safeguards agreement for IAEA verification of Euratom Safeguards. Denmark and Ireland have "NPT safeguards agreements, which will be suspended by the IAEA/Euratom Agreement. France, which is not an NPT Party, will continue to be subject to Euratom safeguards insofar as United States-supplied materials and equipment are concerned.

Appendix H–3

US-IAEA TRILATERAL SAFEGUARDS AGREEMENTS FOR APPLICATION OF IAEA SAFEGUARDS TO U.S.-SUPPLIED MATERIALS [1]

Third party	Effective date	Termination date [1]
Argentina	July 25, 1969	AC.
Australia (suspended July 10, 1974) [2]	Sept. 26, 1966	Do.
Austria (suspended July 23, 1972) [2]	Jan. 24, 1970	Do.
Brazil (amended Sept. 20, 1972)	Oct 31, 1968	Do.
China, Republic of	Dec. 6, 1971	Do.
Colombia	Dec. 9, 1970	Do.
Denmark (suspended Mar. 1, 1972) [2]	Feb. 29, 1968	([3]).
Greece (suspended Mar. 7, 1972; allowed to expire July 27, 1974) [2]	Jan. 13, 1966	July 27, 1974.
India	Jan. 27, 1971	AC.
Indonesia	Dec. 6, 1967	Do.
Iran (suspended May 15, 1974) [2]	Aug 20, 1969	Do.
Israel (initial effective date June 15, 1966) replaced Apr. 4, 1975)	Apr. 4, 1975	Do.
Japan	July 10, 1968	Do.
Korea (amended Mar. 19, 1973)	Jan. 5, 1968	Do.
Philippines (suspended Oct. 16, 1974) [2]	July 19, 1968	Do.
Portugal	July 19, 1969	Do.
South Africa (amended June 18, 1974)	July 26, 1967	Do.
Spain (amended June 18, 1974)	Dec. 9, 1966	Do.
Sweden (suspended May 6, 1975) [2]	Mar. 1, 1972	Do.
Switzerland	Feb. 28, 1972	Do.
Thailand (suspended May 16, 1974; terminated June 27, 1974) [2]	Sept. 10, 1965	Mar. 5, 1975.
Turkey	June 5, 1969	Do.
Venezuela	Mar. 27, 1968	Do.
Vietnam, Republic of (suspended Jan. 9, 1974; allowed to expire June 23, 1974) [2]	Oct. 21, 1965	June 23, 1974.

[1] AC indicates termination on same date as Agreement for Cooperation.
[2] Suspended in view of NPT Safeguards Agreements with IAEA.
[3] Denmark AC expired; cooperation continued under United States/Euratom AC.

Appendix H–4

International Atomic Energy Agency as of 1 January 1976

On 1 January 1976 the Members of the Agency were the 106 States listed below.

Afghanistan
Albania
Algeria
Argentina
Australia
Austria
Bangladesh
Belgium
Bolivia
Brazil
Bulgaria
Burma
Byelorussian Soviet Socialist Republic
Canada
Chile
Colombia
Costa Rica
Cuba
Cyprus
Czechoslovakia
Democratic People's Republic of Korea
Denmark
Dominican Republic
Ecuador
Egypt
El Salvador
Ethiopia
Finland
France
Gabon
German Democratic Republic
Germany, Federal Republic of
Ghana
Greece
Guatemala
Haiti
Holy See
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Ivory Coast
Jamaica
Japan
Jordan
Kenya
Khmer Republic
Korea, Republic of
Kuwait
Lebanon
Liberia
Libyan Arab Republic
Liechtenstein
Luxembourg
Madagascar
Malaysia
Mali
Mauritius
Mexico
Monaco
Mongolia
Morocco
Netherlands
New Zealand
Niger
Nigeria
Norway
Pakistan
Panama
Paraguay
Peru
Philippines
Poland
Portugal
Romania
Saudi Arabia
Senegal
Sierra Leone
Singapore
South Africa
Spain
Sri Lanka
Sudan
Sweden
Switzerland
Syrian Arab Republic
Thailand
Tunisia
Turkey
Uganda
Ukrainian Soviet Socialist Republic
Union of Soviet Socialist Republics
United Kingdom of Great Britain and Northern Ireland
United Republic of Cameroon
United States of America
Uruguay
Venezuela
Viet-Nam
Yugoslavia
Zaire
Zambia

Appendix H–5

U.S.-TYPE NUCLEAR POWERPLANTS ABROAD OPERATING, IN CONSTRUCTION, OR ON ORDER, AS OF JUNE 30, 1975

Country and plant	In operation	In construction or on order	NSS supplier
Austria: Tullnerfeld 1		692	KWU.
Belgium:			
Tihange-1	870		ACLF group.
Tihange-2		900	FRAM/ACECO.
CNW-2		1,000	AECO.
Doel-1	390		AECO.
Doel-2	390		AECO.
Doel-3		930	FRAM/ACECO.
CNW-1		1,000	ACECO.
Brazil: Angra 1		626	W.
Finland:			
Loviisa-1		420	AEE.
Loviisa-2		420	AEE.
TVO-1		660	ASEA-Atom.
TXO-2		660	ASEA-Atom.
France:			
Fessenheim-1	925		Fra/CL.
Fessenheim-2		25	Fra/CL.
Bugey-2		925	Fra/CL.
Bugey-3		925	Fra/CL.
Bugey-4		905	Fra/CL.
Bugey-5		905	Fra/CL.
St. Laurent-3		954	Sogerca Cie GE.
St. Laurent-4		954	Sogerca Cie GE.
Dampierre-1		905	Fra/CL.
Dampierre-2		905	Fra/CL.
Gravelines-1		925	Fra/CL.
Gravelines-2		925	Fra/CL.
Gravelines-3		925	Fra/CL.
Gravelines-4		925	Fra/CL.
Tricastin-1		925	Fra/CL.
Tricastin-2		925	Fra/CL.
Tricastin-3		925	Fra/CL.
Tricastin-4		925	Fra/CL.
X1		925	Fra/CL.
S2		925	Fra/CL.
SENA	310		ACECO/FRA.
Germany:			
GKN 1 Neckarwestheim		805	KWU.
GKN 2 Neckarwestheim		805	KWU.
KKK—Krummel		1,260	AEG.
Brokdorf		1,300	KWU.
KKB—Brunsbuttel	771		AEG.
KKH—Hamm		1,300	KWU.
KKI Isar		870	AEG/KWU.
KKL-Lingen	256		AEG.
KWB-Obrigheim	328		Seimens.
KKP-Philippsburs 1		864	KWU.
KKP-Philippsburs 2		1,250	KWU.
KRB-Gundremminger A	237		GE.
KRB-Grundremminger C		1,249	KWU.
KRB-Gundremminger B		1,249	KWU.
KKS-Stade	630		Siemens.
KWS-Upper Rhine		1,300	KWU.
KWW-WWrgassen	640		AEG.
KKU-Unterweger		1,230	Siemens.
GKW-Gorhrde		1,294	KWU.
Biblis 1	1,150		Siemens.
Biblis 2		1,240	Do.
Biblis 3		1,300	KWU. L
Kaerlich		1,300.	BBR.
India:			
Tarapur 1	200		GE.
Tarapur 2	200		GE.

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U.S.-TYPE NUCLEAR POWERPLANTS ABROAD OPERATING, IN CONSTRUCTION, OR ON ORDER, AS OF JUNE 30, 1975—Continued

Country and plant	In operation	In construction or on order	NSS supplier
Iran:			
Iran 1		1,200	KWU.
Iran 2		1,200	KWU.
Iran 3		900	Fra.
Iran 4		900	Fra.
Italy:			
SENN	150		GE.
SELNI	247		W.
Caorso	840		AMN/Getsco.
ENEL 5		952	EI/WENESE.
ENEL 6		982	AMN/Getsco.
ENEL 7		952	EI/WENESE.
ENEL 8		982	AMN/Getsco.
Japan:			
Hamoaka 1	540		Toshiba.
Hamoaka 2		840	Do.
Shimane	439		Hitachi.
Tsuruga	340		GE.
Tokai 2		1,067	GE.
Mihama 1	320		W.
Mihama 2	470		MHI.
Tokahama 1	781		W.
Tokahama 2	781		MHI.
Mihama 3		781	MHI.
Ohi 1		1,122	W.
Ohi 2		1,122	W.
Genkai 1	529		MHI.
Ikata		538	MHI.
Onagawa		500	Toshiba.
Fukushimo 1	460		GE/Toshiba.
Fukushimo 2	784		GE.
Fukushimo 3		784	Toshiba.
Fukushimo 4		784	Hitachi.
Fukushimo 5		784	Toshiba.
Fukushimo 6		1,100	GE
Korea:			
Ko-Ri 1		564	W.
Ko-Ri 2		605	W.
Luxembourg: Remerschen		1,300	BBR.
Mexico:			
Luguna Verde 1		660	GE.
Luguna Verde 2		660	GE.
Netherlands:			
GKN-Dodewaard	55		GE/GKN.
Borssele	477		KWU/RNB.
Philippines:			
Philippines 1		626	W.
Philippines 2		626	W.
Spain:			
Nuclenor	440		GE.
Almaraz 1		900	W.
Almaraz 2		900	W.
Asco 1		900	W.
Asco 2		900	W.
Cofrentes		930	GE.
Cabo Cope		930	GE.
Lemoniz 1		901	W.
Lemoniz 2		901	W.
Jose Cabrora	153		W.
Sweden:			
Oskarshamn 1	440		ASEA/Atom.
Oskarshamn 2	580		ASEA/Atom.
Ringhals 1	760		ASEA/Atom.
Ringhals 2	809		W.
Forsmark 1		900	ASEA/Atom.
Ringhals 3		900	W.
Ringhals 4		900	W.
Forsmark 2		900	ASEA/Atom.
Barseback 1	580		ASEA/Atom
Barseback 2		580	ASEA/Atom.
Switzerland:			
BKW Muhleberg	306		GETSCO.
BKW Graben 1		1,140	GETSCO.
Leibstadt		955	GETSCO.
NOK-Bezaau 1	350		W.
NOK-Bezaau 2	350		W.
NOK-Kaiseraugst		932	GETSCO.
Goesgen		920	KWU.

U.S.-TYPE NUCLEAR POWERPLANTS ABROAD OPERATING, IN CONSTRUCTION, OR ON ORDER, AS OF JUNE 30, 1975—Continued

Country and plant	In operation	In construction or on order	NSS supplier
Taiwan:			
Chin-shan 1		604	GE.
Chin-shan 2		604	GE.
Kuosheng 1		951	GE.
Kuosheng 2		951	GE.
Nuclear 5		907	W.
Nuclear 6		907	W.
Yugoslavia: KRSKO		615	W.

Appendix H–6

NON-U.S.-TYPE NUCLEAR POWERPLANTS ABROAD, OPERATING, IN CONSTRUCTION, OR ON ORDER, AS OF JUNE 30, 1975

[Megawatts electrical]

Country and plant	In operation	In construction or on order	Supplier
Argentina:			
Atucha	319		Siemens.
Cordoba		600	AECL.
Canada:			
New Brunswick		600	Can. Vickers.
Douglas Point	206		AECL.
Pickering 1	514		AECL.
Pickering 2	514		AECL.
Pickering 3	514		AECL.
Pickering 4	514		AECL.
Bruce 1		745	AECL.
Bruce 2		745	AECL.
Bruce 3		745	AECL.
Bruce 4		745	AECL.
Pickering 5		514	AECL.
Pickering 6		514	AECL.
Pickering 7		514	AECL.
Pickering 8		514	AECL.
Gentilly 1	250		AECL.
Gentilly 2		650	AECL.
France:			
Marcoule G2	40		SACM.
Marcoule G3	40		SACM.
Chinon 2	210		Unknown.
Chinon 3	480		Do.
Monts d'Arree	70		CEA.
St. Laurent 1	480		GCR.
St. Laurent 2	515		CGR.
Bugey 1	540		GCR.
Phenix	233		CEA.
Germany:			
THTR		300	HRB.
Karlsruhe MZER	52		Siemens.
KKN–Niederaichbach	100		Do.
Kalkar		282	Int/B–N/Nera.
India:			
Rapp 1	202		AECL/DAE.
Rapp 2		202	AECL/DAE.
Mapp 1		220	DAE.
Mapp 2		220	DAE.
Napp 1		220	DAE.
Napp 2		220	DAE.
Italy:			
Latina	150		GCR.
Cirene		40	NIRA.
Japan:			
Fugen, ATR		200	Hitachi.
Monju		300	Do.
Korea: Wol Sung		629	AECL.
Pakistan: Kanupp		125	CGE.
Spain: Vandellos		480	GC.
United Kingdom:			
Berkeley 1	138		TNPG.
Berkeley 2	138		TNPG.
Bradwell 1	150		TNPG.
Bradwell 2	150		TNPG.
Trawfynyd 1	250		APC.
Trawfynyd 2	250		APC.
Dungeness A–1	275		TNPG.
Dungeness A–2	275		TNPG.
Sizewell A–1	290		EE–BW–TW.
Sizewell A–2	290		EE–BW–TW.
Hinkley Point A–1	250		EE–BW–TW.
Hinkley Point A–2	250		EE–BW–TW.

NON-U.S.-TYPE NUCLEAR POWERPLANTS ABROAD, OPERATING, IN CONSTRUCTION, OR ON ORDER, AS OF JUNE 30, 1975—Continued

[Megawatts electrical]

Country and plant	In operation	In construction or on order	Supplier
United Kingdom—Continued			
Oldbury 1	300		TNPG.
Oldbury 2	300		TNPG.
Wylfa 1	590		EE-BW-TW.
Wylfa 2	590		EE-BW-TW.
Hinkley Point B-1		625	TNPG.
Hinkley Point B-2		625	TNPG.
Dungeness B-1		600	APC.
Dungeness B-2		600	APC.
Hartlepool 1		625	BNDC.
Hartlepool 2		625	BNDC.
Heysham 1		625	BNDC.
Heysham 2		625	BNDC.
Hunterston A-R1		160	GEC.
Hunterston A-R2		160	GEC.
Hunterston B-R3		625	TNPG.
Hunterston B-R4		625	TNPG.
Calder Hall 1		50	UKAEA.
Calder Hall 2		50	UKAEA.
Calder Hall 3		50	UKAEA.
Calder Hall 4		50	UKAEA.
Chapel Cross 1		50	UKAEA.
Chapel Cross 2		50	UKAEA.
Chapel Cross 3		50	UKAEA.
Chapel Cross 4		50	UKAEA.
Windscale		32	UKAEA.
Winfrith		94	UKAEA.
Dounreay		250	AEA/TNPG.

Appendix H–7

WORLD URANIUM PRODUCTION

[Tons U_3O_8 per year]

	1972	1973	1974	1975 estimated
Argentina	35	58	65	80
Canada	5,200	4,820	4,450	6,110
France	1,790	1,970	2,100	2,200
Gabon	270	650	1,000	1,000
Germany	0	0	30	(1)
Japan	20	13	12	5
Niger	1,130	1,130	1,460	1,560
Portugal	105	95	115	115
South Africa	4,000	3,560	3,520	3,380
Spain	80	80	80	190
United States	12,900	13,300	11,500	13,500
Total, world (rounded)	25,500	25,600	24,300	28,100

[1] Uncertain.

Appendix H–8

WORLD URANIUM RESOURCES

[Thousand tons U_3O_8]

	Reasonably assured	Estimated additional [1]
	$15/lb U_3O_8	
Australia	430	104
South and South-West Africa	242	8
Canada	187	421
Niger	52	26
France	48	33
Algeria	36	
Gabon	26	6
Spain	13	11
Argentina	12	20
Other	[2] 52	26
Foreign subtotal (rounded)	1,100	650
United States	[4] 420	1,620
$15 subtotal (rounded)	1,500	2,300
	$30/lb U_3O_8 (includes $15/lb)	
Australia	430	104
Sweden	390	
South and South-West Africa	359	96
Canada	216	544
France	71	52
Niger	65	39
Algeria	36	
Spain	30	55
Argentina	27	50
Other	[3] 150	110
Foreign subtotal (rounded)	1,770	1,050
United States	[4] 600	2,920
$30 subtotal (rounded)	2,400	4,000

[1] Estimated additional for United States includes possible and speculative potential resources.
[2] Includes Brazil, Central African Republic, Germany, India, Japan, Mexico, Portugal, Turkey, Yugoslavia, and Zaire.
[3] Includes, in addition to countries listed in footnote 2, Denmark, Finland, Italy, Korea, and the United Kingdom.
[4] An additional 100,000 tons U_3O_8 as byproduct.

Appendix H–9

CURRENT AND ANTICIPATED FOREIGN ENRICHING PRODUCTION CAPACITY AND SEPARATIVE WORK (S.W.U.) REQUIREMENTS

Producer	Millions s.w.u.			
	1975	1980	1983	1986
U.S.S.R.[1]	7–10	7–10	7–10	7–10
Eurodif		6.3	10.7	10.7
Urenco [2]	0.02	1.2	5.0	10.0
United Kingdom/Capehurst	.4	.4	.4	.4
France/Pierrelatte [3]	.4	.4	.4	.4
South Africa [4]				.5
Japan		.4	.8	1.3
Brazil			.18	.12
Total foreign capacity [5 6]	7.82–1082	15/7–18.7	24.48–27.48	34.98–37.92
Total foreign separative work requirements	6.1	21.1	33.5	53.4
Foreign separative work requirements (excluding Soviet bloc and Peoples Republic of China)	5.1	17.3	24.7	33.4

[1] Capacity data for U.S.S.R. enrichment plant is unpublished; capacity range shown is taken from an unauthenticated and unclassified source.

[2] Includes the United Kingdom, Germany, and the Netherlands.

[3] Primarily for military requirements; not economically competitive for commercial power reactor fuel production.

[4] Unlike French-led, Eurodif and Urenco who are each firmly committed to construction of enriching capacity, the South African project is still in the exploratory stages and may not meet the production schedule shown. Hence foreign capacity shown for latter years may be overstated. South African pilot enrichment plant now operating.

[5] Of the amounts shown, the Eurodif capacity is reportedly fully committed with 50 pct to France and 50 pct to Italy, Spain, Belgium, and Japan for delivery 1980–89; for Urenco, approximately 60 pct of planned 1981 production of 2,500,000 separative work units, committed by contract or letter of intent to United Kingdom and German utiiities for delivery through mideighties. The U.S.S.R. has recently concluded with non-Soviet-bloc countries a number of enrichment contracts for about 8,500,000 separative work units for delivery through about 1990.

[6] Planned capacity shown does not include that for second Eurodif plant, currently under discussion and scheduled for possible launching late 1975 to early 1976. Europe, Canada, and Australia under consideration as sites for Eurodif II.

Appendix H–10

ESTIMATED CUMULATIVE VALUE OF ENRICHING SERVICES AND REACTOR SALES TO EXPORTING COUNTRY THROUGH DECEMBER 1975

Exporting country	Billion-dollar enriching services	Power reactor sales		Remarks on financing
		Number of reactors	Billion dollars [3]	
United States	Over 19.2 [1]	[4] 48	9.8	Ex-Im Bank with flexible down payment and interest rates below commercial interest rates.
U.S.S.R.	About 1.65 [2]	[5] 2	.3	Barters on some sales.
Urenco (Netherlands, United Kingdom, and Federal Republic of Germany.	2.16 [1]			International credit, joint ownership.
United Kingdom-Capenhurst	.26	2	.1	
France-Eurodif	11.43	9	2.2	BFCE credit agency, with up to 100 percent financing with flexbile interest.
France-Pierrelatte	.86			
Federal Republic of Germany	See Urenco	7	1.8	KEW credit agency, with up to 75-percent financing, generally higher than prime rate.
Canada		5	.5	EDC credit agency, with up to 60 percent on some reactors.
Sweden		2	.4	

[1] Based on 1975 price levels.
[2] Based on estimated price of $45/s.w.u., excluding fuel for reactors in bloc countries.
[3] Based on assumption that $300/KWe accrues to exporting country.
[4] Does not include U.S. share of sales by licenses of U.S. companies or by joint ventures.
[5] Excludes 17 reactors exported to bloc countries—$2 billion.

Appendix H–11

STATUS OF FOREIGN URANIUM ENRICHING SERVICES ACTIVITIES—MAR. 1, 1976

1. U.S.S.R.

Customer country: Firm signing contract	Amount (Mt s.w.u.)[1]	End user/reactor to be fueled	Delivery date	Comments
A. CONTRACTS WITH THE WEST				
France:				
Commissariat a l'Energie	250	Fessenheim-1	1973–74	
Atomique (CEA)	3,500	Unspecified	1979–83	
Italy: Agip Nucleare	About 4,200	do	1972–83	
West Germany:				
Rheinisch-Westfälisches	600	Biblis-B	1974–77	
Elektrizitätswerk (RWE)	3,100	Muelheim-Karlich	1978–90	Estimate based on approximate reload reactor through 1990 assuming 75 pct powerplant availability and 0.3 pct tails.
Kraftwerk Union	2,600	Iran (2)	1979–80	
Gemeinschaftskernkraftwerk Neckar (GNK)	About 600	Neckarwestheim	1976–80	Option for reloads, 1981–85.
Gesellschaft für Kernforschung (GFK)		Niederaichbach	Not available	Permanent shutdown announced. Disposition of contracted amount not known.
Nuklear-Chemie und-Metallurgie (NUKEM)	1,350	Various	1976–80	
Various	About 500	Grafenrheinfeld, Krummel	1976–77	Option for reloads, dates are not available.
Belgium: Synatom	1,300	Doel-3, Tihange-2	1979–85	
Sweden: Svensk Kernbransleforsorjning	300	Unspecified	1979	Option for 1,100 Mt s.w.u. for delivery 1980–89.
Finland: Teollisuuden Voima Oy (TVO)	300	Olkiluoto-1	1977–79	Option for 350 Mt s.w.u. for delivery 1980–85.
Spain: Empresa Nacional del Uranio (Enusa)	5,100	Unspecified	1978–90	
Austria: Gemeinschaftskernkraftwerk Stein	1,260	Stein	1978; 1980–89	
United Kingdom: CEGB	1,000	Various	1980–89	Partial reload requirements for 2 SGHWR's.
B. POTENTIAL COMMITMENTS				
Japan: Not available	1,000/yr	Not available	1976–2000	U.S.S.R. has offered at least 1,000 Mt s.w.u. annually beginning in 1976 and reportedly would prefer to supply 3 to 4 times that much.
United States: General Electric	100	Foreign reactors not specified	1974	Authorized to conclude contract with U.S.S.R. but no action taken.
	3,500		1974–94	
Switzerland: Not available	Not available	Not avilable	Not available	Reports of talks in 1973 concerning Soviet provisions of enrichment services. No firm date.
Brazil: Not available	do	do		Discussion initiated by Brazil.

2. Europe (France)

2. EURODIF (FRANCE)[2]

A. REPORTED AGREEMENTS/CONTRACTS

Japan: Federation of electrical power companies representing 9 utilities.	1,000/yr	To be shared by 9 utilities	1980–89	Agreement signed Jan. 26, 1974, contract signed June 27, 1974.
Spain: NA	400	Not available	1979	Spain reportedly has given Eurodif a letter of intent for these amounts which total 3,900 Mt s.w.u.
	500		1980	
	600		1981	
	700		1982	
	800		1983	
	900		1984	
Switzerland: NA	200 or 1,000	Kaiseraugst	1977–89	Contract figures of 200 and 1,000 Mt s.w.u. reported. One source indicates France's CEA will supply enrichment for the first core and first 2 reloads for delivery 1977 through 1979 with Eurodif supplying the subsequent 9 reloads through 1989.
Iran: NA	1,000/yr	French-supplied reactors	Not available	Under terms of recent Franco-Iranian agreement, Iran will have an option to receive 10 percent of Eurodif's production.
West Germany: RWE, EVS	300	2 reactors currently under construction	1981	These 2 utilities have placed orders with Eurodif.
	120		1982	
	120		1983	
	120		1984	
Italy: CNEN, AGIP	Total, 22,000	ENEL	1980–90	Italy's estimated requirements from Eurodif. It has been reported that Eurodif has requested Italy to accept 1st delivery in 1979—2 yr in advance of that given in the estimate.
Belgium: SOBEN	800/yr	Not available	Post 1980	Annual order expected to be around 800 Mt s.w.u. No firm contracts.
France: EdF	3,000/yr	do	Not available	Unconfirmed report that EdF has placed an order for this amount annually for 10 yr. No firm data on contract. Estimates of EdF's requirements from Eurodif amounts to 4,500/yr.

3. URENCO (UNITED KINGDOM-THE NETHERLANDS-FEDERAL REPUBLIC OF GERMANY)[3]

A. REPORTED AGREEMENTS

West Germany, United Kingdom	15,600	Not available	1978–90	5 utilities in West Germany and the United Kingdom have signed letters of intent for these amounts.
West Germany, Netherlands	do			Negotiations with 6 other utilities for orders expected to bring the total to over 2,000 Mt s.w.u. for delivery in 1980.
Switzerland: NA	Not available	do	Not available	Reported to have placed an order with URENCO.

B. POTENTIAL COMMITMENTS

France: Electricité de France	do	do	do	Unconfirmed reports in April 1974 that EdF planned to discuss a contract with URENCO. No further data.
Japan: NA	do	do	do	Reported discussions negotiations for post-1980 supply.
Spain: ENUSA	do	do	do	Discussions with URENCO as part of Spain's plans to diversity source of supply.
Brazil	do	do	do	Four PWR's.
Open	do	do	do	FRG, France, Spain, Switzerland, and Austria.

[1] Separative work unit. This is the unit of measurement of uranium enrichment production.

[2] Eurodif's production has been reported as already sold for a 12-yr period. However, not all contracts and amounts of separative work are known.

[3] Data pertaining to URENCO sales are conflicting and generally not verified. Most reports indicate commitments of about 2,000 Mt s.w.u. for delivery in 1980; figures for total orders covering 10-yr contracts range from 9,000 to 20,000 Mt s.w.u.

Appendix H–12

NUCLEAR POWER SUPPLY CAPABILITIES OF VARIOUS COUNTRIES AS OF MAR. 1, 1976

Country	NSSS [1] vendors	Other major reactor component vendors	Uranium ore processing	U_3O_8—UF_6 conversion	Fuel fabrication	Spent fuel reprocessing	Enrichment facilities
Argentina			X				
Australia			X				
Belgium [2]	X	X	X		X	X	
Canada	X	X	X	X	X		
France [2]	X	X	X	X	X	X	X
Federal Republic of Germany [2].	X	X	X	X	X	X	X
India	X	X	X	X	X	X	
Italy [2]	X	X		X	X	X	
Japan	X	X		X	X	X	
Netherlands [2]		X			X		[3] X
Portugal			X				
South Africa			X				
Spain		X	X			X	
Sweden							
Switzerland							
U.S.S.R	X	X	[4] X	[4] X	X	[4] X	X
United Kingdom	X	X		X	X	X	[3] X
United States	X	X	X	X	X	[5] X	X

[1] Nuclear steam supply system (independent capability—Canada, France, Germany, Japan, Sweden, and others through a license or by subcontracting).
[2] Member of EURATOM.
[3] Site of centrifuge enrichment facilities of tripartite group—Netherlands, United Kingdom, West Germany.
[4] Not known to have been offered internationally but the capabilities are believed to exist.
[5] U.S. reprocessing facilities presently have no contracts for reprocessing foreign spent reactor fuel and no spare capacity for further contracting.

Appendix H–13

FUEL REPROCESSING CAPABILITIES, AS OF MARCH 1976

(1) EXISTING CAPABILITIES, PRODUCTION AND PILOT SCALE

Country	Facility	Type fuels	Design capacity metric tons U
United Kingdom	British Nuclear Fuels, Ltd., Windscale Works.[1]	Metal, low enrichment [2]	2,500 per year.
France	La Hague (HAO)	UO_2 and metal, low enrichment	800 per year.
	Marcoule	Metal, low enrichment	1000 per year.
Belgium	Eurochemic-Mol	Metal and UO_2 low enrichment and metal, high enrichment.	75 per year low enriched; 1.25 year high enriched (plant shutdown in mid-1974).[3].
India	Trombay	Metal and UO_2 low enrichment	350 kgs per day.

[1] Modification was made at Windscale plant for processing low enrichment oxide (LWR type) fuels; however, this part of plant has been inoperative and is not expected to be restarted until 1978.
[2] Facilities suitable for low-enriched uranium are also suitable for natural assay uranium.
[3] Consideration is being given to restarting of this plant (UO_2 low enrichment) under Belgian ownership and to expand its capacity to 300 MTU/year.

(2) PLANNED CAPABILITIES, PRODUCTION SCALE

Country and/or organization	Facility	Type fuels	Year available	Design capacity metric tons U per year
United Reprocessors, loose marketing and technology exchange organization among France, Germany, and United Kingdom.	La Hague (France).	UO_2, low enrichment.	1976–80	Startup at 100 in 1976, increasing to 800 by 1980, by modification to existing plant.
	Windscale (United Kingdom)	do	1981	800.
	KEWA (Germany).	do	1984	1,600.
Japan	PNC, Tokai-Mura.	do	1976	210.
India	Tarapur	Metal and UO_2 low enrichment.	Being built (cold testing).	100.
United States	NFS West Valley (NY).	UO_2 low	1983	750 (initial capacity—300; shutdown in 1971).
	AGNS	do	1981	1,500.

FUEL REPROCESSING CAPABILITIES, AS OF MARCH 1976—Continued

(3) PROJECTED CAPABILITY; SMALL-SCALE PLANTS; AND DEVELOPMENT ACTIVITY

Country	Facility	Type fuels	Comment
France	Fontenay (AT-1)	Breeder (U-PU oxide)	Pilot plant, near operation (1 kg per day).
Germany	WAK, Karlsruhe	Breeder, UO_2	200 kg per day pilot plant, in operation.
	KFA Juelich	Graphite	2 kg per day pilot plant, scheduled to start 1977.
India	Trombay	Thorium/uranium oxide	Lab-scale facility, in operation.
Japan		UO, low enrichment	1,500 MT per year facility under consideration for 1985.
Italy	EUREX-1-Sallugia	UO_2 and metal	Small pilot plant, in operation.
	ITREC-Rotondella	Thorium/uranium	Do.
	Unnamed	UO_2, low enrichment	500 MTU per year plant, projected in 1985.
Argentina	Ezeiza Nuclear Center	Metal (research reactor fuel).	Lab-scale facility. Has been shutdown, but being reactivated for operation in 1977; may include redesign for UO_2 fuel, low enriched.
Taiwan (Republic of China).	Nuclear Energy Research Institute.	Metal	Lab-scale facility, being built.
	Nuclear Energy Research Institute.	Thorium/uranium oxide	Lab-scale facility, planned
Spain	Juan Vigon Center (Madrid).	Metal	Small pilot plant in operation
Sweden		UO_2, low enrichment	500 MTU per year plant being considered for operation by late 1980's.
Yugoslavia	Boris Kidric Institute	Metal	Lab-scale facility, in operation.
United Kingdom	Dounreay	Advanced fuels, breeder etc.	Pilot plant, in operation.
Canada	Chalk River	Natural oxide	Lab-scale facility (not in use).

Note.—Comment: Other countries have expressed interest in developing fuel reprocessing capabilities which would have to rely on the technology of others—Brazil's planned pilot plant from Germany and a French facility planned for Pakistan. (The Republic of Korea cancelled its plans in 1976 for a French pilot plant.)

Appendix H–14

NATIONAL PROGRAMS ON MIXED-OXIDE ((U,PU) O_2) FUEL FABRICATION

Country, location, owner	Fuel type	Present capacity, metric tons per year	Comments
Belgium, Dessel, Belgo-Nucleaire	Thermal, pellet, fast.	18, approximately 2.	Planned expansion of 35 MT per year.
Canada, Chalk River, AECL	Thermal, pellet	3	CANDU thermal recycle.
France, Cadarache, CEA	Thermal, fast	10–15	Ianned expansion for Super Phenix requirements.
Germany, Hanauu-Wolfgang, ALKEM	do	2	Ianned expansion to 35 MT per year.
India, Bombay, BARC	do	Lab-Scale	Fast (pellet) pilot due to startup in 1977 at 0.25 MT per year.
Italy, Casaccia, CNEN	Thermal	Pilot	Pilot facility shutdown. Proposed 20 MT per year. Fast fuel plant planned for 1982.
Japan, Tokai, PNC	Thermal, fast	below 1	
Netherlands Hague, RCN	Thermal	do	
United Kingdom:			
(a) Dounreay, UKAEA	Fast, pellet	do	Expermental fuels.
(b) Windscale, BNFL	Fast	5–10	Plans call for 20 MT by 1979 and 50 MT per year by 1987.
U.S.A.:			
(a) Parks Township, Pa., B. & W.	Thermal	8	
	Fast	2.5	
(b) Crecent Okla., Kerr-McGee	do	(2.5)	Closing down.
(c) Cheswick, Pa., Westinghouse	Thermal	15	
(d) Richland, Wash., Exxon	do	15	
(e) Pleasanton, Calif., EG	do	5	
	Fast	Below 1	
U.S.S.R.—SCAE	do		